MS-DOS® 5 *QuickStart*

The Step-By-Step Approach

Self-Instruction Guide to MS-DOS 5!

Award-Winning Visual Approach

Step-By-Step Instructions

Covers Through DOS Version 5

que®

MS-DOS® 5 QuickStart

Que® Development Group

Text and graphics developed by
Bill Weil

QUE®

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Contents at a Glance

Introduction 1

1 Understanding Computer Technology 7

2 Learning Your DOS ABCs 33

3 Starting DOS and Understanding Commands 49

4 Understanding and Using the DOS Shell 65

5 Understanding and Using Directories 91

6 The DOS Format 115

7 Maintaining Files 133

8 Running Applications 169

9 Using the DOS Command Line 199

10 Protecting Your PC's Data 225

11 Other Commands 251

12 Customizing DOS 267

13 More Advanced DOS Commands 299

14 Common Commands and Your PC 327

15 Errors Great and Small 375

Appendix: Setup and Installation 401

Index 415

Table of Contents

Introduction **1**

Making Friends with DOS 1
What Is MS-DOS? 2
What Does This Book Contain? 3
What Hardware Do You Need To Run MS-DOS? 4
Conventions Used in This Book 5

1 Understanding Computer Technology **7**

Key Terms Used in This Chapter 8
Understanding Computer Technology 10
Components of Computer Systems 11
Text and Graphics Displays 13
Text Display 14
Graphics Display 15
Keyboards 16
AT and Enhanced Keyboards 19
Special Keyboards 20
Keyboards for Portables 21
The System Unit and Peripherals 21
The System Unit 22
Disk Drives and Disks 23
Peripherals 25
How Computers Work with Data 29
Lessons Learned 32

2 Learning Your DOS ABCs **33**

Key Terms Used in This Chapter 34
What is an Operating System? 34
Understanding DOS Files 36
What Different Files Do 36
The Three Parts of DOS 38
The Command Interpreter 38
The File and Input/Output System 39
The Utility Files 39

What DOS Does 42
Managing Files 42
Managing Directories 43
Managing Disks 44
Running Applications Programs 44
Running Batch Files 45
Handling Miscellaneous Tasks 45
Knowing the Uses of DOS 45
Development of DOS 45
Lessons Learned 47

3 **Starting DOS 49**
Key Terms Used in This Chapter 50
Definitions Made Simple 51
Creating a Good Physical Environment 52
Booting Your PC 53
The Cold Boot 53
What Booting Looks Like 54
The Warm Boot 56
Looking at DOS 56
The Current Logged Drive 57
Looking at Directories 57
The First Look at Commands 59
Looking at the DOS Shell 59
The First Look at the DOS Shell 60
Stopping the Computer 62
Lessons Learned 63

4 **Understanding and Using the DOS Shell 65**
Key Terms Used in This Chapter 66
Understanding the DOS Shell 67
Selecting Items 70
Using the Mouse 70
Using the Keyboard 71
Making Menu Selections 72
Using the Mouse with Menus 73
Using the Keyboard with Menus 73
Cancelling Menus 74

Using Dialog Boxes 75
Entering Text in Dialog Boxes 76
Selecting Options in Dialog Boxes 77
Using Command Buttons 77
Using Scroll Bars 78
Getting On-Line Help 80
Running Programs from the Shell 81
Using the Task Swapper 82
Changing the Shell Display 83
Changing the Shell View 83
Changing the Shell Display Mode 86
Changing the Shell Colors 87
Using Shortcut Keys 88
Leaving the DOS Shell 88
Lessons Learned 89

5 Understanding and Using Directories 91

Key Terms Used in This Chapter 92
The DOS Directory Concept 92
Navigating a Hard Disk's Directories 93
Paths in the Tree Structure 96
Path Names 96
Where the Search Starts 98
Viewing the Directory Structure 99
Exploring Sample Subdirectories 101
The Root Directory 102
The \DOS Directory 102
The \BATCH Directory 102
The \UTIL or \UTILITY Directory 102
The \DATA Directory 103
The \TEMP Directory 103
The \MISC or \KEEP Directory 104
Applications Software Directories 104
Managing a Hard Disk Drive 104
Creating a New Directory 105
Changing the Current Directory 106
Removing a Directory 107

Viewing Directories 108
Understanding Wild Cards 109
Changing File Display Options 110
Displaying File Information 113
Lessons Learned 113

6 The DOS Format 115
Key Terms Used in This Chapter 116
Understanding Floppy Disks 116
Understanding Different Floppy Disks 118
Matching Floppy Disks and the Disk Drive 119
Formatting Floppy Disks 120
Understanding Safe Formatting 123
Formatting Different Types of Disks 124
Looking at the FORMAT Command's Output 126
Quick Formatting 127
Learning FORMAT's Other Switch Options 128
The /S (Transfer System Files) Switch 128
The /U (Unconditional Format) Switch 128
Other Size Switch Options 129
Understanding FORMAT's Error Messages 129
Cautions about Formatting a Hard Disk 131
Lessons Learned 132

7 Maintaining Files 133
Key Terms Used in This Chapter 134
Files and Labels 134
Copying and Moving Files with the Shell 135
Understanding the Principles of Copy and Move 135
Selecting the Correct View 138
Selecting Source Files 139
Copying Files between Disks 144
Copying a File to the Same Disk Directory 147
Copying Files Across Directories 148
Copying Safety versus Speed 151
Moving Files Between Disks 152
Moving Files to another Directory 155
Deleting Files 157

Renaming Files 158
Using Disk Copy To Copy Disks 160
Using Disk Copy with Different Types of Drives 164
Verifying With Disk Copy 165
Lessons Learned 167

8 Running Applications 169

Key Terms Used in This Chapter 170
Understanding Programs and Program Groups 170
The Original DOS Groups 171
Opening Groups and Running Programs 172
Creating a New Program Group 173
Adding a Program to a Program Group 175
Completing the Add Program Dialog Box 177
Copying a Program to a Program Group 178
Maintaining Program and Group Information 181
Changing Program Properties 181
Running Programs 182
Using the Task Swapper 182
Running Programs from the Files List 185
Running Programs with the Run Command 186
Running Programs from Associations 186
Advanced Techniques for Running Applications 189
Installing Applications 189
Completing the Commands Box in the Program Properties Dialog Box 190
Using Replaceable Parameters in a Commands Box 191
Starting a Program with a Batch File 194
Other Program Properties 195
Lessons Learned 197

9 Using the DOS Command Line 199

Key Terms Used in This Chapter 200
Moving from the Shell To the Command Line 200
Important Concepts about Commands and the Command Line 201
Syntax 203
Switches 204

Issuing Commands 210
Typing the Command Name 211
Adding Parameters 211
Ignoring a Command (Esc) 211
Executing a Command 212
Using DOS Editing Keys 212
Using DIR To View File Lists 213
Defining the DIR Command 214
Specifying Other Directories 215
Changing Directories 217
Controlling Scrolling 218
The Wild-Card Characters 219
Using Wild Cards in the DIR Command 219
Using the Copy Command from the Command Line 220
Using Other Commands from the Command Line 222
Executing Programs from the Command Line 223
Lessons Learned 224

10 Protecting Your PC's Data 225

Key Terms Used in This Chapter 226
Avoiding Data Loss 226
Taking Preventative Measures To Avoid Data Loss 227
Recovering From Data Loss 233
Restoring From Backup Copies 239
Preparing for the Backup 240
Full Backup Considerations 240
How Often To Back Up Hard Disks 240
Preparing Backup Floppies 241
Issuing the BACKUP and RESTORE Commands 243
Syntax for BACKUP 243
Syntax for RESTORE 247
Avoiding DOS Version Conflicts 249
Lessons Learned 250

11 Other Commands 251

Key Terms Used in This Chapter 252
Viewing File Contents 252
Locating a File 256
Using MEM (Memory Report) 258

Using CHKDSK (Check Disk) 258
Using CHKDSK /F 259
Using CHKDSK before a Backup 261
Understanding CHKDSK and Fragmentation 261
Using CLS (Clear Screen) 263
Using VER (DOS Version) 263
Using VERIFY (File-Writing Verification) 263
Using VOL (Display Volume Name) 264
Using LABEL (Change a Volume Name) 264
Lessons Learned 265

12 Customizing DOS 267

Key Terms Used in This Chapter 268
The PATH Command 269
The PROMPT Command 270
Understanding Meta-Strings 271
Customizing Your Prompt 272
Defining the Batch File 273
Creating a Batch File 274
Storing Batch Files 275
Creating a Batch File with COPY CON 275
Creating a Batch File with the DOS Editor 277
Rules for Batch Files 279
Rules for Running Batch Files 280
Understanding the AUTOEXEC.BAT File 280
Creating an AUTOEXEC.BAT File 284
Viewing the AUTOEXEC.BAT File 284
Backing Up the Existing File 284
Modifying an AUTOEXEC.BAT File 285
Keeping Several Versions of AUTOEXEC 286
Understanding the CONFIG.SYS File 286
Specifying Files and Buffers 287
Designating Device Drivers 288
Understanding Advanced DOS Configuration Options 289
Creating and Changing a CONFIG.SYS File 290
Creating Sample Batch Files 291
Using Batch Files to Execute Programs 291
Simplified Backup Using a Batch File 295
A Batch File To Display Help Text 296
Lessons Learned 297

13 More Advanced DOS Commands 299

Key Terms Used in This Chapter 300
Recovering Damaged Files 301
DOS Devices and Redirection 302
The COPY CON Device 304
Redirection 306
Pipes and Filters 307
Using the FIND Filter 307
Using the SORT Filter 308
Using the MORE Filter 309
Using DOSKEY, the Command Line Editor 310
Recalling Previous Commands with DOSKEY 310
Editing Previous Commands with DOSKEY 316
Managing Memory 317
Types of Memory 318
Using the HIMEM Extended Memory Manager 319
Using EMM386 320
Loading Drivers and Programs into High Memory 321
Using RAMDrive 323
Lessons Learned 324

14 Common Commands and Your PC 327

DOS Commands by Purpose 327
External Commands 330
A Note about Notation 330
APPEND 331
Command Syntax 331
Follow These Steps 331
ASSIGN 332
Command Syntax 332
Follow These Steps 332
ATTRIB 333
Command Syntax 333
Follow These Steps 333
BACKUP 334
Command Syntax 334
Follow These Steps 334
CHDIR or CD 335
Command Syntax 335
Follow These Steps 335

CHKDSK 336
Command Syntax 336
Follow These Steps 336
CLS 337
Command Syntax 337
Follow These Steps 337
COMP 338
Command Syntax 338
Follow These Steps 338
COPY 339
Command Syntax 339
Follow These Steps 339
DATE 340
Command Syntax 340
Follow These Steps 340
DEVICE 341
Command Syntax 341
Follow These Steps 341
DIR 342
Command Syntax 342
Follow These Steps 342
DISKCOMP 343
Command Syntax 344
Follow These Steps 344
DISKCOPY 344
Command Syntax 345
Follow These Steps 345
DOSKEY 346
Command Syntax 346
DOSSHELL 346
Command Syntax 346
Follow These Steps 347
ECHO 347
Command Syntax 347
EDIT 348
Command Syntax 348
Follow These Steps 348
ERASE or DEL 349
Command Syntax 349
Follow These Steps 349

FASTOPEN 350
Command Syntax 350
Follow These Steps 350
FC 351
Command Syntax 351
Follow These Steps 351
FIND 352
Command Syntax 352
Follow These Steps 352
FORMAT 353
Command Syntax 353
Follow These Steps 353
HELP 355
Command Syntax 355
Follow These Steps 355
JOIN 355
Command Syntax 355
LABEL 356
Command Syntax 356
Follow These Steps 356
MEM 356
Command Syntax 357
Follow These Steps 357
MIRROR 357
Command Syntax 357
MKDIR or MD 358
Command Syntax 358
Follow These Steps 358
MORE 359
Command Syntax 359
Follow These Steps 359
PATH 359
Command Syntax 360
Follow These Steps 360
PROMPT 360
Command Syntax 360
Follow These Steps 361
REN 361
Command Syntax 361
Follow These Steps 362

REPLACE 362
Command Syntax 362
Follow These Steps 362
RESTORE 363
Command Syntax 363
Follow These Steps 363
RMDIR or RD 365
Command Syntax 365
Follow These Steps 365
SORT 365
Command Syntax 366
Follow These Steps 366
SYS 366
Command Syntax 366
Follow These Steps 366
TIME 367
Command Syntax 367
Follow These Steps 367
TREE 368
Command Syntax 368
Follow These Steps 368
TYPE 369
Command Syntax 369
Follow These Steps 369
UNDELETE 369
Command Syntax 370
UNFORMAT 370
Command Syntax 370
VER 371
Command Syntax 371
Follow These Steps 371
VERIFY 372
Command Syntax 372
Follow These Steps 372
VOL 372
Command Syntax 373
Follow These Steps 373
XCOPY 373
Command Syntax 373
Follow These Steps 373

15 Errors Great and Small 375

What are Error Messages? 375
How Serious Are Error Messages? 376
Interpreting Error Messages 376

A Setup and Installation 401

Key Terms Used in This Appendix 402
Requirements to Install MS-DOS 5 402
Making Backup Copies 403
Installing MS-DOS 5 405
Installing on a Hard Disk 405
Installing on Floppy Disks 407
Upgrading from a Previous Version of DOS 408
Upgrading on Floppy Disks 411
After the Installation or Upgrade is Complete 411
If You Have Problems with MS-DOS 5 413
Preserving DOS Shell Settings 413

Index 415

Introduction

This book describes the connection between personal computer hardware and the disk operating system and explains to beginning users all the most frequently used DOS commands from the DOS Shell and the command line. After you become familiar with DOS's commands and features, you can use the graphics presented here for quick reference.

Making Friends with DOS

DOS is easy! You've heard that statement before. It's the kind of glib remark that might make you wish for an adding machine and ballpoint pen instead of a computer. Maybe you had a personal computer placed on your desk by a manager who "knows you can figure it out."

In a way, that's the worst rub because who wants to admit that they don't know where to begin? After all, your manager might conclude that you are not part of the high-tech generation. He or she might consider you an anachronism in the rapidly changing workplace.

To add to the injury, perhaps everyone's eyes have shifted in your direction, secretly relieved that you—and not they—were chosen for the ordeal. Scanning your surroundings, your eyes focus on the gray cover of a

Making friends with DOS

What is MS-DOS?

What does this book contain?

What hardware do you need to run MS-DOS?

Conventions used in this book

thick book. It's the notorious DOS Manual, that coldly unemotional collection of cryptic commands, disjointed addendums, appendixes, suffixes, prefixes, and file listings.

As a young boy, I felt ambivalent about trips to the library. This was odd because I enjoyed reading, and I loved the feel of books in my small hands. Seeing row upon row of file cabinets filled with index cards, however, made my stomach tighten.

In time, I grew accustomed to the patronizing stares of bored librarians and the barbs of superiority from schoolmates. Although I long ago mastered the Dewey Decimal System, those wooden cabinets still make me a bit edgy.

Not that the system is incoherent or inconsistent: it isn't. In fact, the logic of the library system is remarkable. Nonetheless, the assumption that a logical system will be easy to learn simply because it is coherent and consistent is the ultimate in callousness.

Every day, thousands of intelligent Americans scratch their heads and berate themselves, falling prey to a multi-billion-dollar scam. After all, virtually everybody has been inundated by computer advertisements. You see ads in the newspapers, read mailings on sale items, hear about them from friends, and feel guilty about not learning how to use a computer.

Now, you've a new computer at your office, or you've decided that a PC will make working at home more efficient. No matter what the reasons, you are now face-to-face with DOS.

What Is MS-DOS?

By itself, a computer is just a box and a screen. Ultimately, you are faced with the test of bringing it to life. This means mastering the computer's operating system, which for most of us is MS-DOS.

MS-DOS (or to most PC users, just DOS) is a tool you use to manage the information your computer stores in disk files. DOS is a collection of programs that form a foundation for you and your programs to work effectively with your computer. DOS is a set of standard routines that your programs use to access the services of the PC.

No matter what anybody tells you, the letters "D-O-S" do not stand for "Disheartening Obtuse Sadist." To make the most of your PC, you really have to understand its basics. Understanding DOS is required to enhance the enjoyment and productivity of running your microcomputer.

This book is an introduction to the most widely used Disk Operating System in the world. You will find that the material presented here is written in a unique matter. You won't be patronized with elementary definitions, and you won't be force-fed a litany of cryptic terms.

The microcomputer has gained respectability in the business world because of its ability to place technology directly in the hands of the people who most need that technology. As a result, the computer has automated both large and small businesses and boosted productivity in the office.

What Does This Book Contain?

Learning DOS can be enjoyable. *MS-DOS 5 QuickStart* is painless and worthwhile reading. Each chapter takes you on a guided tour of a specific part of DOS. You will be introduced to the concept of the MS-DOS Shell and its straightforward, easy to use menus. Also you will be shown how you can type commands that DOS understands using the command line prompt.

At first you may feel like a spectator, but as you read each chapter, you will find the text fast-moving and the ideas presented in easy-to-understand graphics.

Chapter 1 describes the components of personal computer systems: the display, the keyboard, the system unit, and peripherals. The last part of this chapter traces the way computers handle data.

Chapter 2 covers the fundamental concepts of how an operating system works, including its different parts. You will learn how to start—or boot—the computer in Chapter 3.

Chapter 4 introduces you to the DOS 5 Shell and how to operate the Shell. You also learn how to customize the Shell.

Chapter 5 teaches you about directories. You learn how to navigate the tree structure of a disk. You use the Shell's Directory Tree area to visualize the concept of directories.

Chapter 6 teaches you how to prepare disks so that they can be used.

In Chapter 7, you learn the fundamentals of copying, moving, deleting, and renaming files. You also learn to copy an entire disk.

One of the functions of DOS is to enable you to start applications. Chapter 8 shows you how to start applications from the Shell. You learn to create and maintain program groups in the Shell.

Chapter 9 introduces you to the command line. You learn how to issue commands, and specifically, how to use the DIR and COPY commands.

Chapter 10 shows you how to protect your PC's data. In this chapter, you learn how to use BACKUP and RESTORE.

Chapter 11 introduces you to some of DOS's less-used commands. Although these commands, such as MEM, CHKDSK, and CLS are not used as often as COPY or DEL, they are important to learn.

After you become more comfortable using DOS, you will want to customize DOS for your use. Chapter 12 provides information on how to customize DOS with the PATH and PROMPT commands. You also are introduced to batch files.

Chapter 13 describes the more advanced DOS commands. You learn about redirection and piping, DOS filters, and how to better manage the memory in your computer.

Chapter 14 is an alphabetical command reference. Use this chapter to find the syntax for commands you want to use from the command line.

The final chapter discusses the error messages you may encounter as you use DOS and what action you should take to remedy the situation.

An appendix covers DOS installation for both floppy disk and hard disk systems.

Finally, a detailed index helps you quickly find the information you need on a specific topic.

What Hardware Do You Need To Run MS-DOS?

The type of computer most likely to use MS-DOS is one that is compatible to a great extent with the International Business Machine Corporation's Personal Computer (IBM PC). COMPAQ, Zenith Data Systems, Tandy, Advanced Logic Research, AT&T, AST, EPSON, Wang, NEC, Toshiba, Sharp, Leading Edge, Hewlett-Packard, and many other companies manufacture or market MS-DOS-based personal computers.

The computer should have at least 256 kilobytes (256K) of system random-access memory (RAM), at least one floppy disk drive, a display (screen), and a keyboard. These suggestions are minimal; most MS-DOS PCs sold today exceed these requirements.

For convenience and processing power, you may want to include a second floppy disk drive, a hard disk with at least 20 megabytes of storage capacity, a printer, and a color graphics display. You cannot use MS-DOS on most computers made by Apple Computer Inc., Commodore (except the new Amiga computers, when equipped with additional hardware), or Atari. These computers use operating systems that are sometimes referred to as DOS, but their operating systems are not MS-DOS compatible.

Conventions Used in This Book

Certain conventions are used throughout the text and graphics of *MS-DOS 5 QuickStart* to help you better understand the book's subject.

This book uses a symbolic form to describe command syntax. When you enter a command, you substitute real values for the symbolic name. Examples present commands that you can enter exactly as shown.

DOS commands can have various forms that are correct. For example, the syntax for the DIR command looks like this if you use symbolic names:

DIR *d:filename.ext /W/P*

DIR is the command name. The *d:filename.ext* is a symbolic example of a disk drive name and a file name. A real command would have actual values instead of symbols.

Some parts of a command are mandatory—required information needed by MS-DOS. Other command parts are optional. For the DIR command example, only the **DIR** is mandatory. The rest of the command, *d:filename /W/P*, is optional. When you enter only the mandatory command elements, DOS is many cases uses already-established values for the optional parts.

You can type upper- or lowercase letters in commands. DOS reads both as uppercase letters. You must type syntax samples shown in this book letter-for-letter, but you can ignore case. Items shown in lowercase letters are variables. You type the appropriate information for the items shown in lowercase letters.

In the example, the lowercase *d:* identifies the disk drive the command will use for its action. Replace the *d:* with A:, B:, or C:. The *filename.ext* stands for the name of a file, including its extension.

Spaces separate some parts of the command line. The slash separates other parts. The separators, or delimiters, are important to DOS because they help DOS break the command apart.

For example, typing **DIR A:** is correct, **DIRA:** is not.

Text that you must type is displayed in **boldface blue** type. Screen displays appear in this `special typeface`.

Keys are shown as they appear on the keyboard. The color blue emphasizes some of the more important areas of the graphics illustrations.

MS-DOS 5 QuickStart is your guide to becoming comfortable using DOS on your personal computer.

1

Understanding Computer Technology

Have you ever wondered why our society has emotional attachments for some machines, but not for others? We love our automobiles, for example, but we don't feel that way about our refrigerator, sink, or lawnmower.

This attachment to cars comes from our capacity to develop a very interactive relationship with a mechanical beast. We are social creatures, and not many mechanical contraptions supply us with that give and take we seem to need. That may be why we have such love affairs with those that do.

For some people, a personal computer is another machine that provides an abundance of emotional "bang for the buck". Other people, however, may feel disappointment with their first computer purchase. It may appear to be little more than a big dumb box. If not for the fact that most people must use a personal computer for business, they may have preferred to buy a new television set.

Exploring text and graphics displays

Understanding keyboards

Getting acquainted with the system unit and peripherals

Learning how computers work with data

Understanding Computer Technology

1

Although you may be anxious about getting started, once you understand something about how the computer works, you will feel a good deal better about learning to use it. This chapter provides a quick, but illuminating, lesson about how personal computers work. Learning about the personal computer, its components, and how all the parts work together is like learning new car controls: displays and keyboards (dashboards), the CPU (engine control unit), peripherals (tires), and disk drives (the cassette player).

Does a computer take you from zero to sixty in six seconds? Even faster: it takes you close to the speed of light. Computers may not yet turn you into an Indy car driver, but you will be capable of participating in a drama of your own making.

This chapter explains the components that have become a standard for the IBM PC and compatibles. Do you need to remember every term you read? Not unless you are a college student preparing for a final exam. Nevertheless, this chapter's design will help you enjoy working with your new computer. After all, it's always useful to know where the oil goes in your car. And as cars have their own terminology, so does the personal computer.

Every term defined here is rooted in the English language. These terms are no more mysterious than such terms as *dashboard*, *acceleration*, *mileage*, *pause*, or *reverse*. Computer terms are simple to remember and impressive to use at the office. Knowing them may even get you a raise.

Key Terms Used in This Chapter

CPU	Stands for Central Processing Unit. The processor in which the actual computing takes place. It is the brain of the computer.
Display	The screen or monitor.
Peripheral	Any device, aside from the computer itself, that permits you to do something or shows the results. A good example of a peripheral is your printer.
Disk	A plastic or metal platter coated with magnetic material, used to store files. A *disk drive* records and reads back information on disks. Disks come in two basic sizes and function like the cassettes placed in your tape recorder. The main difference is that disks resemble small L.P. records. Like the arm of a phonograph, the read/write

	head swings into position over the spinning disk to make data retrieval quick and simple. The disk drive head can swing right to the data you need.
Modem	A device for exchanging data between computers through standard telephone lines. A modem is similar to your telephone handset. Just remember that a computer has neither mechanical hands, vocal cords, nor ears. All information transfers via computer-generated audio signals.
Input	Any data given to a computer.
Output	Any data transmitted by a computer.
Bit	A binary digit. The smallest discrete representation of a value a computer can manipulate. A computer thinks only in numbers. Several numbers make up a character, such as a word or letter. In short, bits are similar to the dot/dash concept used in Morse code.
Byte	A collection of eight bits that a computer usually stores and manipulates as a full character (letter, number, or symbol). A byte is a character identified by a sequence of numbers.
K (kilobyte)	1024 bytes, used to show size or capacity in computer systems. Technically, the term *kilo* means thousand, but allow the computer revolution its poetic license.
M (megabyte)	1024 kilobytes.
Data	A broad term meaning words, numbers, symbols, graphics, or sounds. Data is any information stored in computer byte form.
File	A named group of data in electronic form. In word processing, a file can be a letter to a friend. In a database system, a file can be a name and address telephone listing.

1 Understanding Computer Technology

Until a few years ago, computers were large, expensive machines generally unavailable to individual users. Although the rich could afford them, not many people wanted to fill three rooms of their homes with energy-guzzling electronics that served no practical purpose.

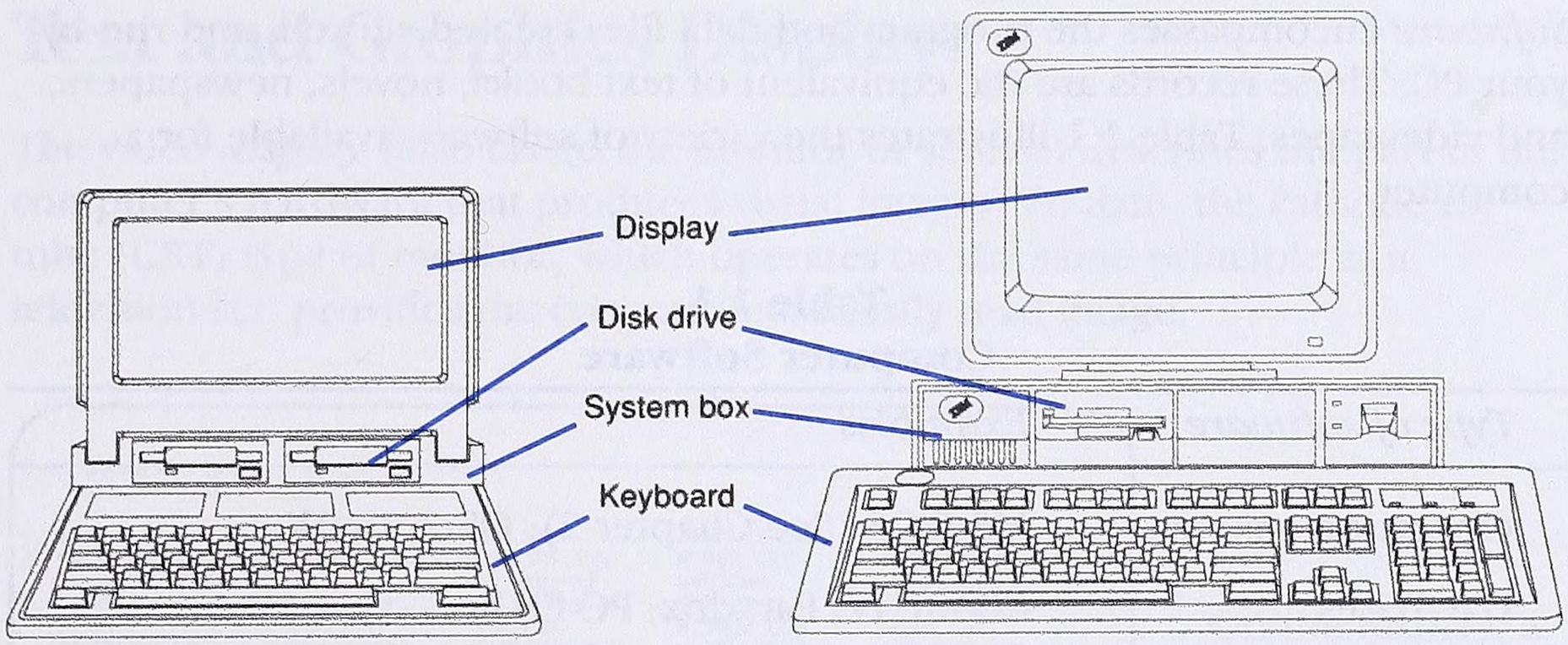
Advances in computer technology led to the engineering of smaller computer parts called *integrated circuits,* more commonly known as *chips*. The actual processing in a personal computer takes place on one of these chips, called the *microprocessor*. The newer, high-capacity chips meant a savings in both space and energy. The ultimate product of chip technology is the *microcomputer* as exemplified by your personal computer.

In 1981, International Business Machines (IBM) introduced the IBM Personal Computer or PC. Whether or not the PC is the best of the breed is arguable, but IBM did give personal computers respectability in the business community. As a leader in the large business computer market, IBM held an excellent marketing position. IBM's name, sales force, and corporate contacts made the PC today's standard in home and business computing. The arrival of the Personal Computer worked out well. IBM created both a market for PCs and a standard upon which other firms have built.

Today, many manufacturers produce computers that are in many ways superior to the IBM product line. Rapid technical developments in newly-created companies are raising microcomputer technology to new heights. Even the venerable IBM uses much of this technology in its newest PCs.

Although the Apple II and Macintosh are also personal computers, the term *PC* has come to mean those computers made by IBM and other manufacturers that run the MS-DOS operating system. Originally, PCs by other manufacturers were called *compatibles*, but were only partially compatible with the IBM PC. Today, these personal computers are often called *clones* and, if well-made, operate virtually the same as the equivalent IBM models.

The intense competition among PC manufacturers over the last few years benefits everybody. Never before can you purchase so much computing power at such a reasonable price.



Laptop computer

Desktop computer

Components of Computer Systems

A computer system is composed of hardware parts that exist in a variety of configurations. All MS-DOS computers operate in essentially the same manner. Engineers base the size of the computer more on human physiology than on anything else. Designers developed the standard model to be large enough to contain disk drives and other devices. The portable, on the other hand, is small and light, perfect for computing while on the road.

Personal computer systems based on the IBM PC are functionally the same, despite the wide variety of configurations available. As long as you have the main components, the shape and size of your computer matter very little. For example, you can find equally powerful machines in the traditional desktop configuration, in floor models, in portable laptop models, or in compact lunchbox-sized computers. The wide variety of PC software operates equally well in any of these cosmetic configurations.

Hardware and software make up the two main segments of a computer system. Both segments must be present for a computer to work. Many texts waste several pages supplying complicated definitions for terms that are simple, but this book won't.

Hardware refers to the physical machine and its peripherals—electronics and moving parts of metal and plastic. A VCR, television, tape deck, CD, and turntable also are everyday examples of hardware.

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Software encompasses the program and data files created, stored, and run by your PC. These records are the equivalent of text books, novels, newspapers, and videotapes. Table 1.1 illustrates the variety of software available for a computer.

Table 1.1
Computer Software

Type of software	*Examples*
Operating systems	MS-DOS (See Chapter 2); OS/2; UNIX
Databases	dBASE IV; Paradox; PC-FILE
Spreadsheets	Lotus 1-2-3; Excel; Quattro Pro
Word processors	WordPerfect; Microsoft Word; PC-WRITE
Utilities	Fastback Plus; PC Tools Deluxe; SideKick
Graphics	Harvard Graphics; Corel Draw; Lotus Freelance
Integrated programs	Symphony; Microsoft Works; Q&A
Games	Flight Simulator; Tetris; SimCity
Home finance	Quicken; Managing Your Money
Desktop publishing	First Publisher; Ventura Publisher; PageMaker

The *operating system* provides the working base for all other programs by creating a uniform means for programs to gain access to the full resources of the hardware. Operating systems that help programs to access disks are called *disk operating systems*, or DOS.

This book covers the common operating system for IBM PC compatibles: MS-DOS. The IBM versions of DOS and the various versions of Microsoft Corporation's DOS are highly compatible. Actually, they are nearly identical, except that IBM calls its version PC DOS, whereas Microsoft calls its version MS-DOS. For this reason, *DOS* is used in this text as the generic term when referring to both packages.

Text and Graphics Displays

The video *display* (also called the monitor or screen) describes the part of the computer's hardware that produces visual images. To date, the cathode ray tube (CRT) type of monitor, which operates on the same principle as a television set, provides the crispest, most easily read image.

```
 Volume Serial Number is 1635-3EC8
 Directory of C:\DOS

[.]             [..]            EGA.SYS         DISPLAY.SYS     FORMAT.COM
PACKING.LST     ANSI.SYS        COUNTRY.SYS     HIMEM.SYS       KEYB.COM
KEYBOARD.SYS    MODE.COM        SETVER.EXE      SYS.COM         UNFORMAT.COM
DEBUG.EXE       DOSKEY.COM      EDLIN.EXE       EMM386.EXE      FASTOPEN.EXE
FC.EXE          FDISK.EXE       MEM.EXE         MIRROR.COM      MORE.COM
RAMDRIVE.SYS    SHARE.EXE       SMARTDRV.SYS    UNDELETE.EXE    GWBASIC.EXE
XCOPY.EXE       DOSSHELL.VID    DOSSHELL.INI    DOSSHELL.COM    DOSSHELL.EXE
LINK.EXE        DOSSHELL.GRB    DOSSWAP.EXE     EXE2BIN.EXE     PRINT.EXE
REPLACE.EXE     TREE.COM        DOSSHELL.HLP    EDIT.HLP        RECOVER.EXE
DOSHELP.HLP     HELP.EXE        QBASIC.HLP      EDIT.COM        NSHERC.COM
QBASIC.EXE      MONEY.BAS       REMLINE.BAS     APPEND.EXE      ATTRIB.EXE
BACKUP.EXE      CHKDSK.EXE      COMP.EXE        DISKCOMP.COM    DISKCOPY.COM
FIND.EXE        LABEL.EXE       RESTORE.EXE     SORT.EXE        4201.CPI
4208.CPI        5202.CPI        ASSIGN.COM      DRIVER.SYS      EGA.CPI
EXPAND.EXE      README.TXT      NETWORKS.TXT    UMB.TXT         GRAFTABL.COM
GRAPHICS.COM    GRAPHICS.PRO    CATAPULT.BAS    NIBBLES.BAS     JOIN.EXE
LCD.CPI         NLSFUNC.EXE     PRINTER.SYS     SUBST.EXE       CLEANUP.EXE
CLEANUP.INF     COMMAND.COM     QBASIC.INI
        88 file(s)     2236138 bytes
                       3205120 bytes free

C:\DOS>
```

On the display, a blinking symbol (box, underscore, or other character) shows where the next character appears. This symbol is the *cursor*.

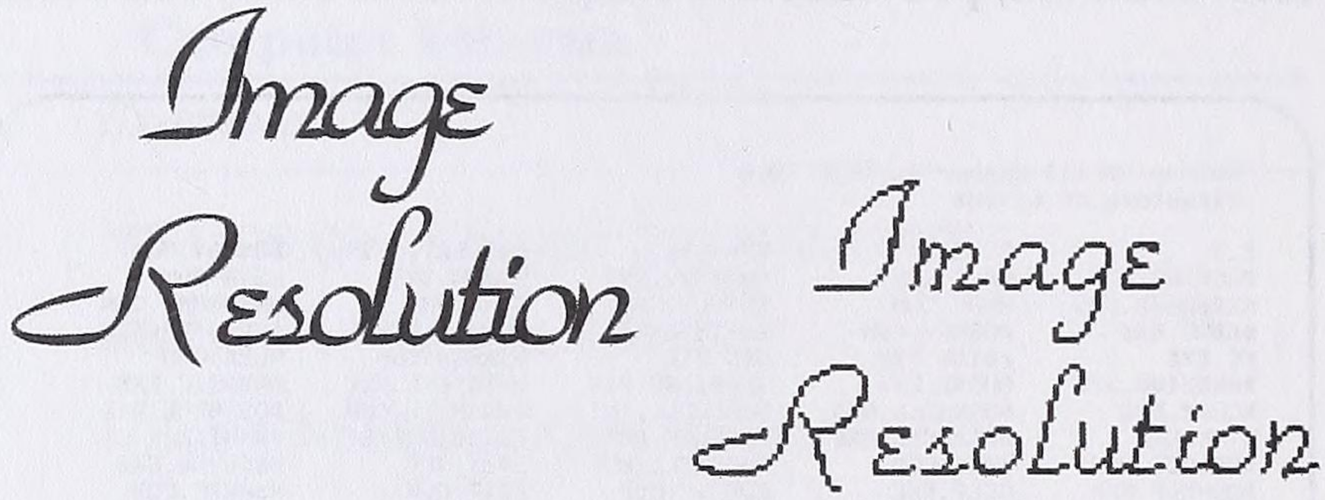
Personal computers are interactive. Interactive means that the PC reacts to any action you take and shows the results on the computer display screen. The video display is the normal, or *default*, location the computer uses to communicate with you.

Manufacturers also incorporate other types of technology into computer displays. For example, to build flatter displays, manufacturers use a technology known as gas plasma. Gas plasma displays produce an orange color against a dark background. This type of display is found primarily in portable computers, where a TV-type display would be heavy and cumbersome.

Another technology adapted to computer displays is liquid crystal. Liquid crystal displays (LCDs) work on the same principle as today's digital watch displays. Most LCDs produce dark characters against a lighter background.

LCDs work well in brightly lit rooms, because the light striking the display increases the contrast of the display image. Some LCDs also use a backlight to increase the display's contrast. This type of display appears primarily on laptops.

Regardless of the display type, all computer screens take electrical signals and translate them into patterns of tiny dots, or *pixels*. Pixel is an acronym coined from the phrase *picture element*. You can recognize pixels as characters or figures. The more pixels a display contains, the sharper the visual image. The number of pixels in the image determines its *resolution*.



The higher-resolution image (left) uses four times as many pixels as the low-resolution image (right).

The resolution of the visual image is a function of both the display and the *display adapter*. The display adapter controls the computer display. In some PCs the display circuitry is a part of the motherboard (see this chapter's section "The System Unit and Peripherals"). The display adapter also can reside on a separate board that fits into a slot in the computer. The display adapter can be a monochrome display adapter (MDA), Hercules monochrome graphics adapter (MGA), color graphics adapter (CGA), enhanced graphics adapter (EGA), video graphics array adapter (VGA), extended graphics array adapter (XGA), or other less common display adapter.

Text Display

When you see letters, numbers, or punctuation on your display, you recognize these images as text. This text comes from your computer's memory where the text has been stored under the standard that most computers recognize, the American Standard Code for Information Interchange (ASCII).

Each ASCII code represents a letter or a symbol. These codes are sent to the display adapter so that you can see the characters on the screen. Because ASCII is the industry standard, the display adapter uses an electronic table to pull the correct pixel pattern for any letter, number, or punctuation symbol.

Although 128 standard ASCII codes exist, a single computer character can contain 256 different codes. The upper codes are known as IBM *extended* ASCII codes. These additional codes are used for patterns of foreign language letters, mathematical symbols, lines, corners, and special images, such as musical notes.

If a program needs to display a pixel or pattern of pixels not included in the ASCII-to-pixel table, you are out of luck. Text adapters cannot generate graphics. Of the various display adapters available, only the monochrome display adapter (MDA) is a text-only display adapter. Because so much software today is graphically-oriented, virtually all personal computers sold today have graphics displays.

Graphics Display

Graphics displays can produce any pixel, or pattern of pixels. This type of display enables you to view, on-screen, complex figures with curves and fine detail. The computers work harder to create graphics images than text images, however, because images are "painted" on the screen with pixels. To light the correct point on the display, the display adapter must find the screen coordinate points for each pixel. Unlike text mode, no table of predetermined pixels exists for graphics mode.

Graphics displays differ in the number of pixels available. The greater the number of pixels, the finer the detail of the display. Each pixel contains characteristics that describe to the graphics adapter what the color or intensity of the pixel should be. The greater the number of colors and intensities, the more storage space in memory you need. Graphics adapters offer varying combinations of pixel density, number of colors, and intensity.

Table 1.2 lists the most common display types, showing the maximum resolution, and the colors available with each type of display adapter.

Table 1.2
Resolution and Colors for Display Adapters

Adapter Type	*Graphics Mode*	*Pixel Resolution*	*Colors Available*
CGA	Medium resolution	320 x 200	4
CGA	High resolution	640 x 20	2
EGA	CGA high resolution	640 x 200	16
EGA	EGA high resolution	640 x 350	16
MGA	Monochrome graphics	720 x 348	2
MDA	Text characters only	80 x 25	2
VGA	Monochrome	640 x 480	2
VGA	VGA high resolution	640 x 480	16

continues

Table 1.2 *(continued)*

Adapter Type	*Graphics Mode*	*Pixel Resolution*	*Colors Available*
VGA	VGA Medium resolution	320 x 200	256
Super VGA	Super VGA	800 x 600	256
Super VGA	1024 Super VGA	1024 x 768	256
XGA	Standard mode	1024 x 768	256
XGA	16-bit color mode	640 x 480	65,536

The number of colors available on the display depends on the amount of memory on the adapter and the program you are using. For example, a Super VGA adapter with 512K of video memory can display 256 colors, but the software may only display 16 colors. A Super VGA adapter with 256K of video memory can display only 16 colors even if the software can display 256 colors.

Keyboards

The keyboard is the most basic way in which you enter information into the computer. The computer then converts every character you type into code the machine can understand. The keyboard is therefore an *input device*.

Like a typewriter, a computer keyboard contains all the letters of the alphabet. The numbers, symbols, and punctuation characters are virtually the same. The computer keyboard has the familiar QWERTY layout. The term *QWERTY* comes from the letters found on the left side of the top row of letters on a standard typewriter. However, a computer keyboard differs from a typewriter keyboard in several important ways.

The most notable differences of the computer keyboard are the extra keys that do not appear on a typewriter. These keys and their standard functions are described in table 1.3. Some of these keys have different functions when used with different programs. Also, depending on the type of computer and keyboard you use, you will see 10 or 12 special *function keys*.

Table 1.3
Special Keys on the Computer Keyboard

Key		*Function*
↵Enter	Enter	Signals the computer to respond to the commands you type. Also functions as a carriage return in programs that simulate the operation of a typewriter.
→, ←, ↓, ↑	Cursor keys	Changes your location on the screen. Included are the arrow, PgUp, PgDn, Home, and End keys.
←Backspace	Backspace	Moves the cursor backward one space at a time, deleting any character in that space.
Del	Delete	Deletes, or erases, any character at the location of the cursor.
Ins	Insert	Inserts any character at the location of the cursor.
⇧Shift	Shift	Capitalizes letters when you hold down Shift as you press another letter key. When pressed in combination with another key, Shift can change the standard function of that key.
Caps Lock	Caps Lock	Enables you to enter all capital letters when the key is pressed down in the locked position. Caps Lock doesn't shift the numbered keys, however. To release, press the key again.
Ctrl	Control	Changes the standard function of a key when pressed in combination with another key.
Alt	Alternate	Changes the standard function of a key when pressed in combination with another key.

continues

Table 1.3 *(continued)*

Key	*Function*
Esc Escape	Enables you to escape from a current operation to a previous one in some situations. Sometimes Esc has no effect on the current operation.
Num Lock Number Lock	Changes the numeric pad from cursor-movement to numeric-function mode.
PrtSc Print Screen	Key found on Enhanced Keyboards. Sends the characters displayed to the printer.
Scroll Lock Scroll Lock	Locks the scrolling function to the cursor-movement keys. Instead of the cursor's moving, the screen scrolls.
Pause Pause	Suspends display activity until you press another key. (Not provided with standard keyboards.)
Break Break	Stops a program in progress from running.
7 8 9 4 5 6 1 2 3 0 . Numeric keypad	A cluster of keys to the right of the standard keyboard. The keypad includes numbered keys from 0 to 9 as well as cursor-movement keys and other special keys.

Many of the function keys are designed for use in combination with other keys (see table 1.4). For example, holding down the Ctrl key as you press the PrtSc key causes DOS to continuously print what you type. Pressing Ctrl and PrtSc a second time turns off the printing. The Break key is not a separate key. With some keyboards, a break is caused by pressing the Ctrl and Scroll Lock keys together. With other keyboards, a break is caused by pressing the Ctrl and Pause keys together.

Table 1.4
DOS Key Combinations

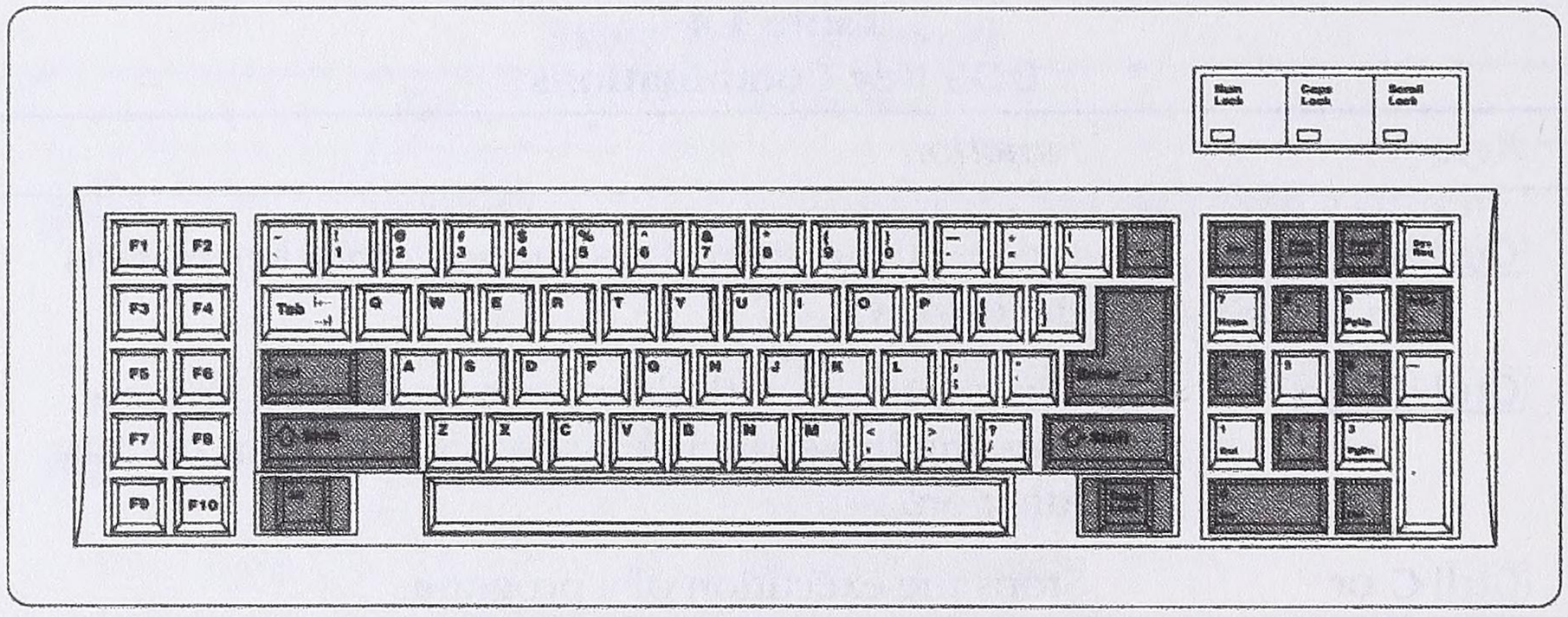
Keys	*Function*
Ctrl-S	Freezes the display. Pressing any other key restarts the display.
Ctrl-PrtSc	Sends lines to both the screen and to the printer; pressing this sequence a second time turns off this function.
Ctrl-C or Ctrl-Break	Stops the execution of a program.
Ctrl-Alt-Del	Restarts MS-DOS (system reset).

The *function keys* are shortcuts or command keys. Not all programs use these keys, and some programs use only a few of the them. When used, however, these keys automatically carry out certain operations for you. For example, programs often use the F1 key for *on-line help*. On-line help displays instructions to help you understand a particular operation. The DOS 5 shell uses the F3 key to cancel the shell. The F10 key activates the menu.

The original standard keyboard contains the function keys F1 through F10 on the left side. The standard Extended keyboard offers keys F1 through F12, which are located across the top of the standard keyboard. This Extended keyboard must have been designed by programmers. These people are known for being poor typists and this keyboard layout is the result. On the other hand, the Extended keyboard has a cursor control keypad separate from the numeric keypad.

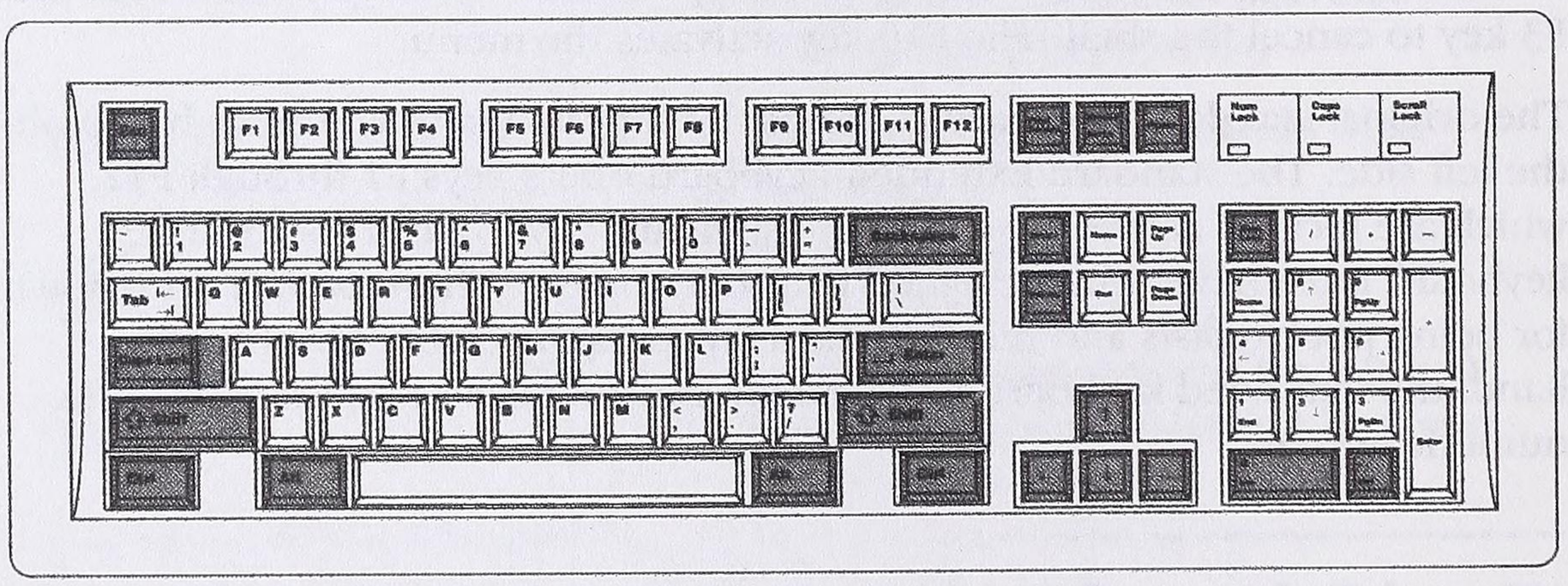
AT and Enhanced Keyboards

Many early PC-compatible computers use a standard keyboard design similar to that of the IBM PC. Other machines use a Personal Computer AT-style keyboard. The IBM PS/2 computers and almost all other personal computers today use a 101-key Enhanced Keyboard. Some users prefer the layout of the standard keyboard, and others prefer the Enhanced Keyboard.



AT Keyboard

You can determine whether your computer has a standard keyboard, a Personal Computer AT-style keyboard, or an Enhanced Keyboard. You find certain keys only on specific keyboards. For example, you find separate Print Screen and Pause keys only on the Enhanced Keyboard. You can, however, simulate these keys by using a combination of keys on the standard keyboard.



Enhanced Keyboard

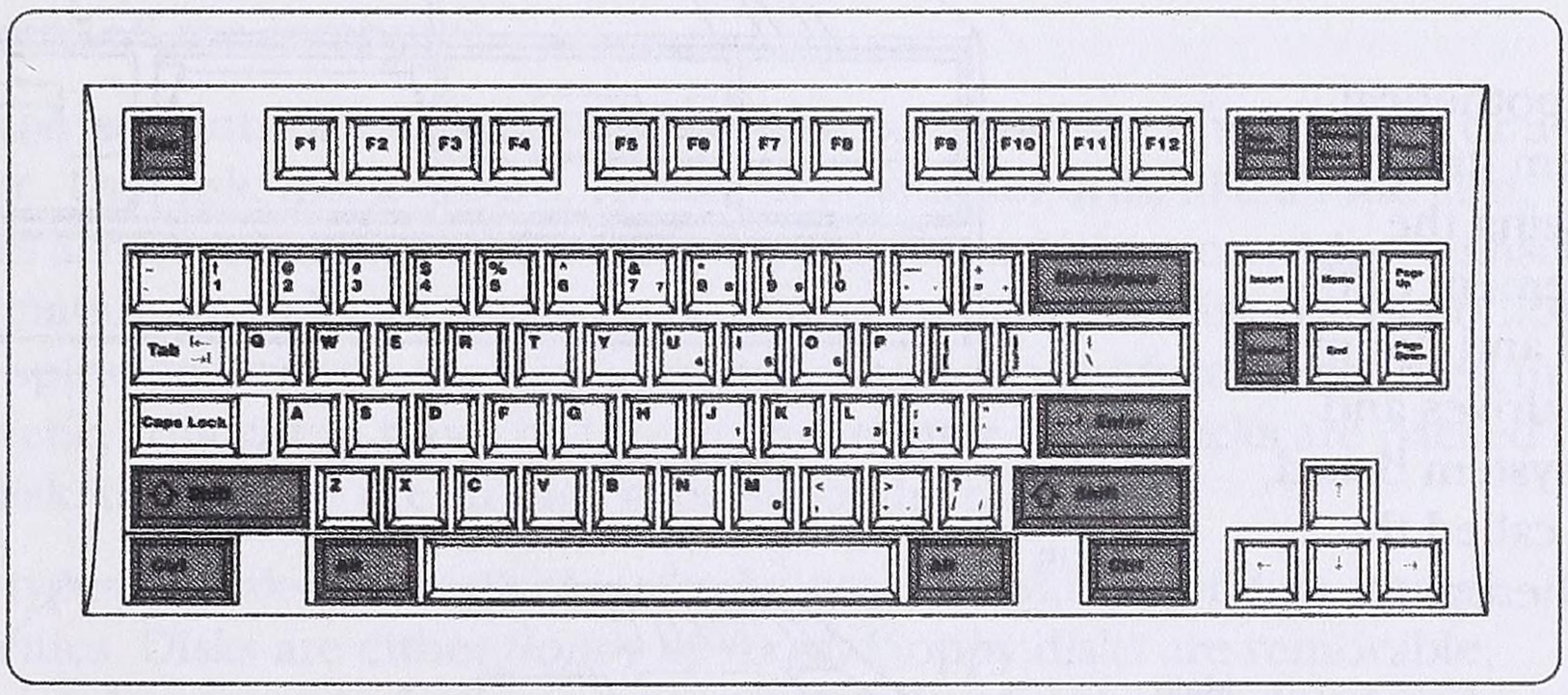
Special Keyboards

Some new keyboards try to provide both the advantages of the older and the newer keyboards. Such keyboards enable you to change key caps and switch key definitions for the Caps Lock, Ctrl, Esc, and tilde (~) keys. Some keyboards provide the enhanced layout, but locate the function keys on the left side of the keyboard instead of at the top.

Northgate Computer Systems, for example, offers keyboards with the separate cursor keys arranged exactly the same as they are on the numeric keyboard. This arrangement makes the cursor keys easier to use with most software. One keyboard model has a set of functions keys across the top and a second set on the left so that you can choose which set to use.

Keyboards for Portables

Small "lunchbox" and laptop portable computers employ nonstandard keyboards, usually to conserve space. A few of these computers have so little keyboard space that you may need to add an external numeric keypad for software that manipulates numbers.



Space-Saver Keyboard

If your PC came with the standard F1 through F10 keys and your friend's keyboard has 12 function keys, don't feel cheated. The standard keyboard is better for people involved in text-intensive work. Triggering a word processing command with your left pinkie is a snap because your fingers rarely have to leave the home keys. Also, the standard keyboard has a larger Enter key, and quick fingers don't plunge into plastic valleys.

The System Unit and Peripherals

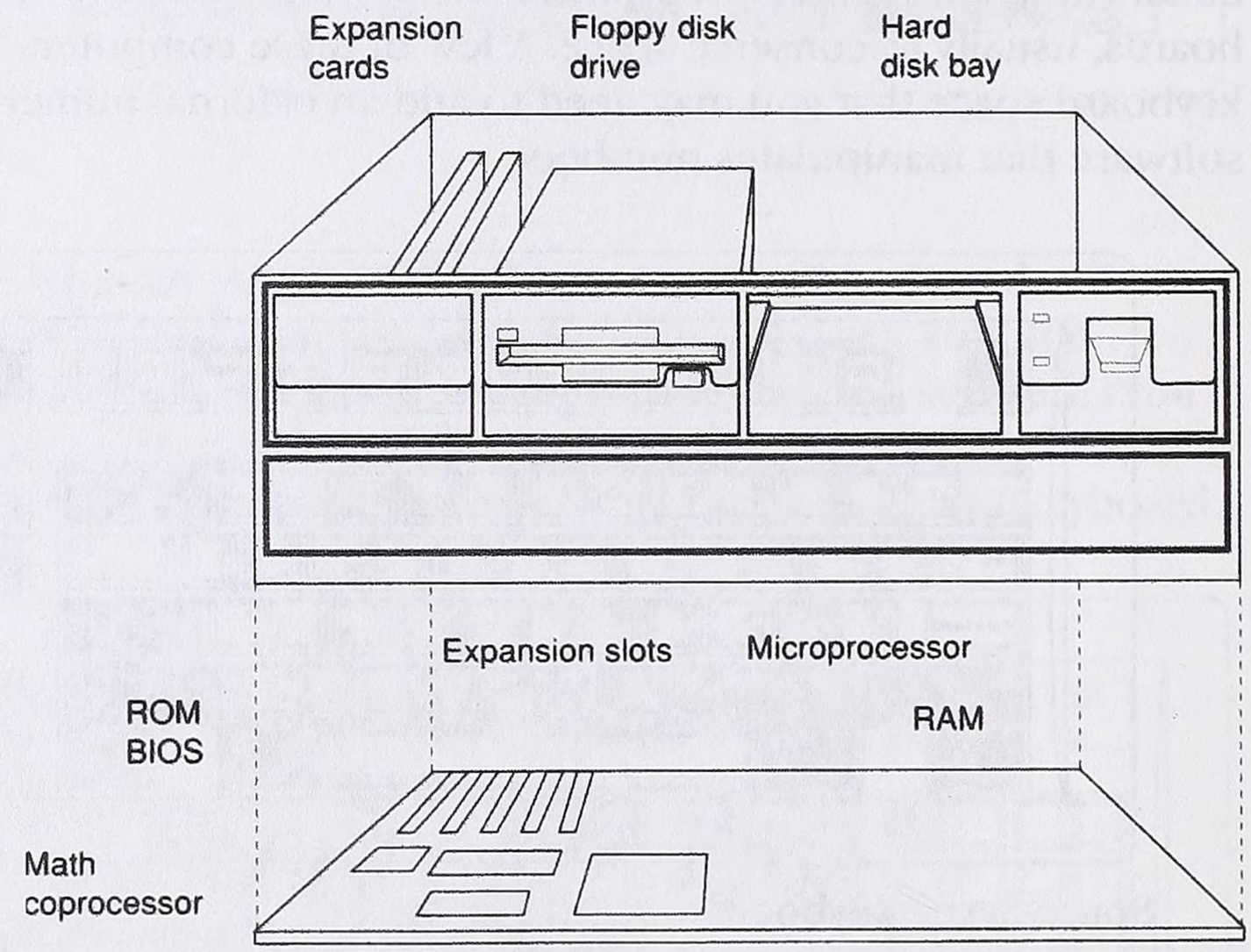
Industry engineers designed the standard desktop PC around a box-shaped cabinet that connects to all other parts of the computer. This box is called the *system unit*. The devices attached to it are *peripherals*. The system unit and the peripherals complete the hardware portion of the computer system.

1

The System Unit

The system unit houses all but a few parts of a PC. Included are various circuit boards, the disk drives, a power supply, and even a small speaker.

The system units on today's PCs come in many variations of the original design. Desktop models are smaller to conserve disk space. Larger models with room for larger, multiple hard disks and other peripherals often use a floor-standing tower design that requires no desk space at all.



A hypothetical system unit, showing the placement of the hard and floppy disk drives and the system board, also called the motherboard.

The motherboard holds the main electronic components of the computer. The microprocessor, the chips that support it, and various other circuits are the primary parts on the motherboard. The motherboard usually contains electrical sockets in which you can plug in various adapter circuit boards. These electrical sockets are called *expansion slots*.

Chips that provide the computer with its memory are located on the motherboard. You can plug additional memory adapter cards into an available expansion slot to increase the system's memory. The number of available expansion slots varies with each PC builder. Most motherboards have a socket for a math coprocessor. Math coprocessors help speed up programs that

manipulate large volumes of graphics or math equations. Spreadsheet programs and desktop publishing software, for example, benefit from the addition of a math coprocessor chip.

Disk Drives and Disks

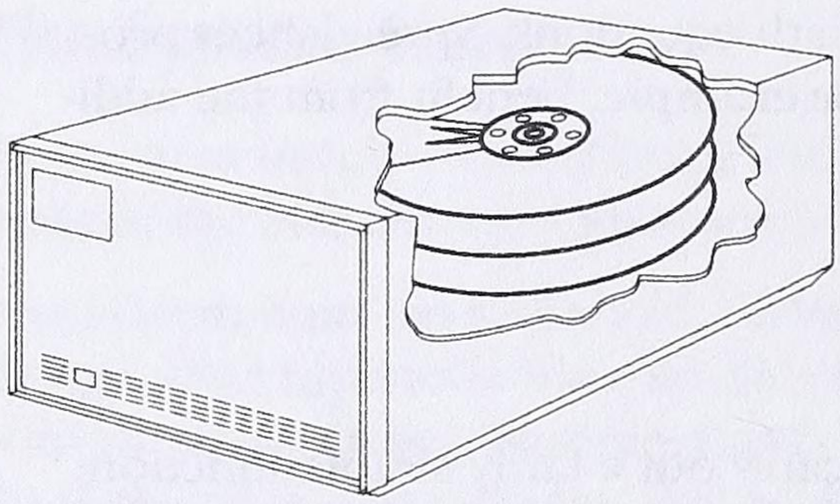
Disk drives are complex mechanisms that carry out a fairly simple function: they rotate *disks*, circular platters or pieces of plastic that have magnetized surfaces. As the disk rotates, the drive converts electrical signals from the computer and places the information into or retrieves information from magnetic fields on the disk. The storage process is called *writing* data to the disk. Disk drives also recover, or *read*, magnetically stored data and present it to the computer as electrical signals. Magnetically stored data is not lost when you turn off the computer.

The components of a disk drive are similar to those of a phonograph or a CD player. The disk, like a record, rotates. A positioner arm, like a tone arm, moves across the radius of the disk. A head, like a pickup cartridge, translates information into electrical signals. Unlike phonographs, disk drives do not have spiral grooves on the disk's surface. The disk's surface is recorded in magnetic, concentric rings, or *tracks*. The tighter these tracks are packed on the disk, the greater the storage capacity of the disk.

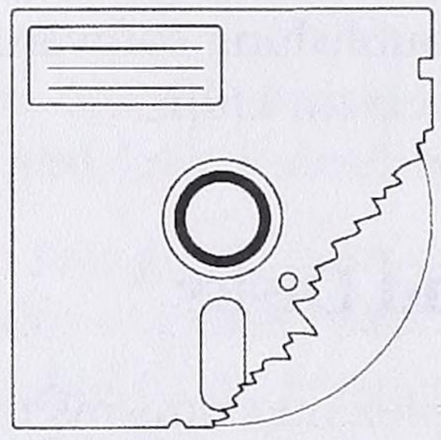
Two types of disks are available, which come in a variety of data storage capacities. Disks are either *floppy* or *hard*. Floppy disks are removable, flexible, slower, and of a lower capacity than hard disks. Hard disks, also called *fixed* disks, are usually high-capacity rigid platters that cannot be removed as floppies can.

When a computer writes to the disk, it stores groups of data that the operating system identifies as *files*. You can tell that a drive is reading or writing a floppy disk when the small light on the front of the disk drive glows. You should never open a drive door or eject a disk until the light goes out, unless the computer specifically instructs you to do so.

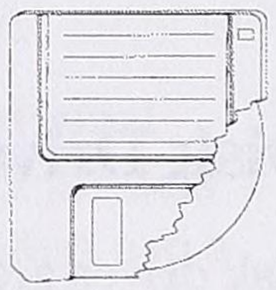
When a hard drive is reading or writing data, a light may glow on the front of the drive or there may be a separate disk-drive light on the front of the system unit.



Hard disk drive



Minifloppy disk



Microfloppy disk

Hard disks are sealed inside the hard disk drive. Floppy disks are encased in flexible 5 1/4-inch jackets or in rigid 3 1/2-inch jackets. The 3 1/2-inch disks are often called *diskettes* because with their rigid shells they are no longer floppy.

Floppy Disks

Floppy disks store from 360K to 2.88M bytes of data and come in two common sizes. Originally, the 5 1/4-inch floppy disks were called *minifloppies* to distinguish them from the 8-inch disks used on very early personal computers. The 3 1/2-inch diskettes are sometimes called *microfloppies*. The measurement refers to the size of the disk's jacket. Unless size is important, this book simply refers to both disk types as *floppies*.

In almost all cases, the disk drive uses both sides of a disk for encoding information. Therefore, the disk drives and the floppy disks are called *double-sided*.

A drive can handle only one size disk. You cannot read a 5 1/4-inch floppy disk in a 3 1/2-inch disk drive or vice versa. Table 1.5 shows a number of different floppy disk capacities. Only the most common floppy disk types are listed. The disk capacities are in kilobytes (K) or megabytes (M).

Table 1.5
Common Floppy Disk Types

Disk Type	*Capacity*
5 1/4-inch	
Double density	360K
High density	1.2M
3 1/2-inch	
Double density	720K
High density	1.44M

Make sure that you know your drive's specification before you buy or interchange floppies. Floppies of the same size, but with different capacities, can be incompatible with a particular disk drive.

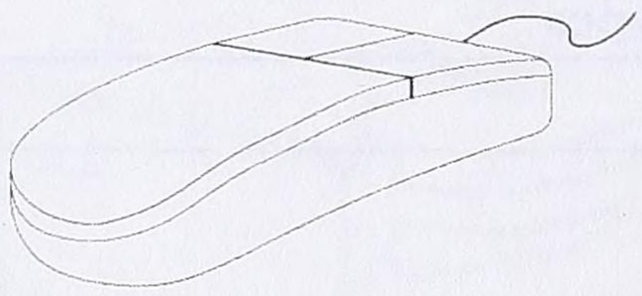
A high density disk drive, for example, can format, read, and write to both high density and double density floppy disks. A double-density disk drive can use only double density disks.

Hard Disks

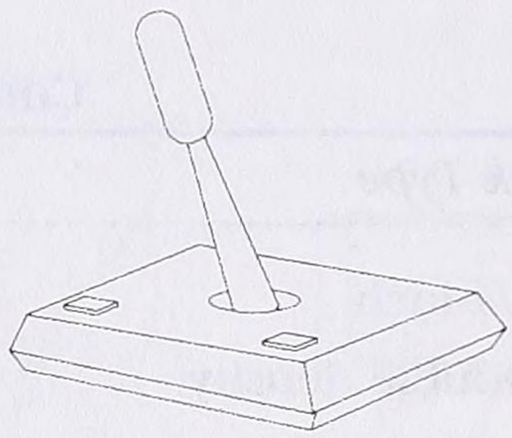
Hard disks often consist of multiple, rigid-disk platters. There is a separate head for each side of each platter. The platters spin at 3,600 RPM, much faster than a floppy disk drive spins. As the platters spin within the drive, the head positioners make small, precise movements above the tracks of the disk. Because of this precision, hard disks can store large quantities of data—from 10M to hundreds of megabytes. Hard disks are reasonably rugged devices. Factory sealing prevents contamination of the housing. With proper care, hard disks can deliver years of trouble-free service.

Peripherals

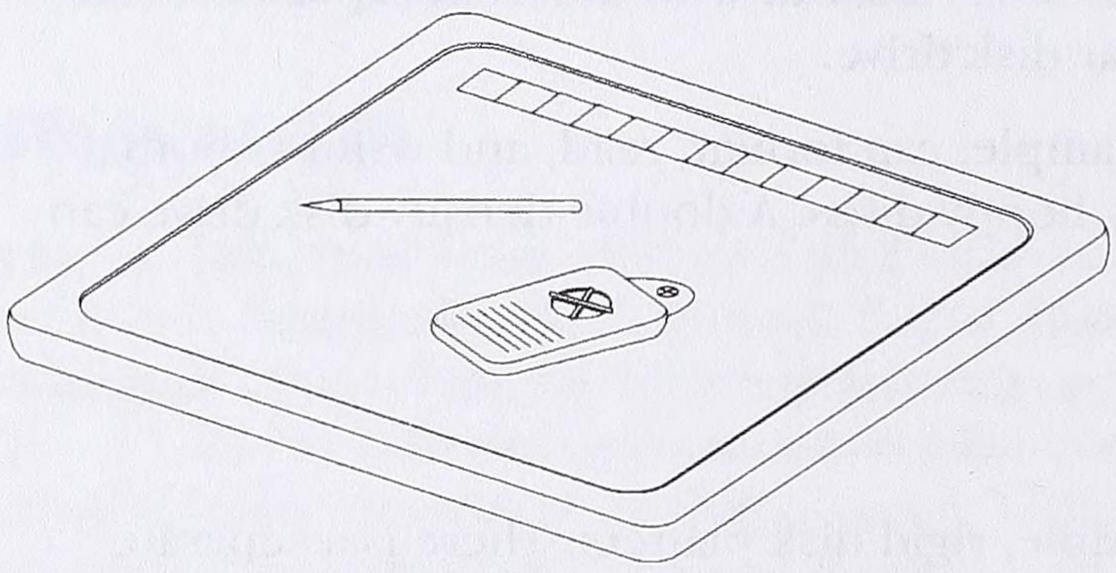
Besides the display, keyboard, and disk drives, a variety of peripherals can be useful to you. Peripherals such as a mouse, printer, modem, joystick, and digitizer enable you to easily communicate with your computer. For example, using a mouse with a modern computer program—such as a desktop publishing package—takes best advantage of the program's features.



A mouse is a computer pointing device whose shape vaguely resembles that of a real mouse. You use a mouse with graphics programs and modern graphical interfaces such as the DOS 5 shell.



A joystick is popular for use in games and is used to enter information into the computer. Often, joysticks replace keyboard operations.



For many users, a digitizer tablet feels more natural than using a mouse. When a digitizer's "puck" moves across the tablet, that motion is displayed on-screen. It is used most often in high-end graphics and CAD programs.

The Mouse

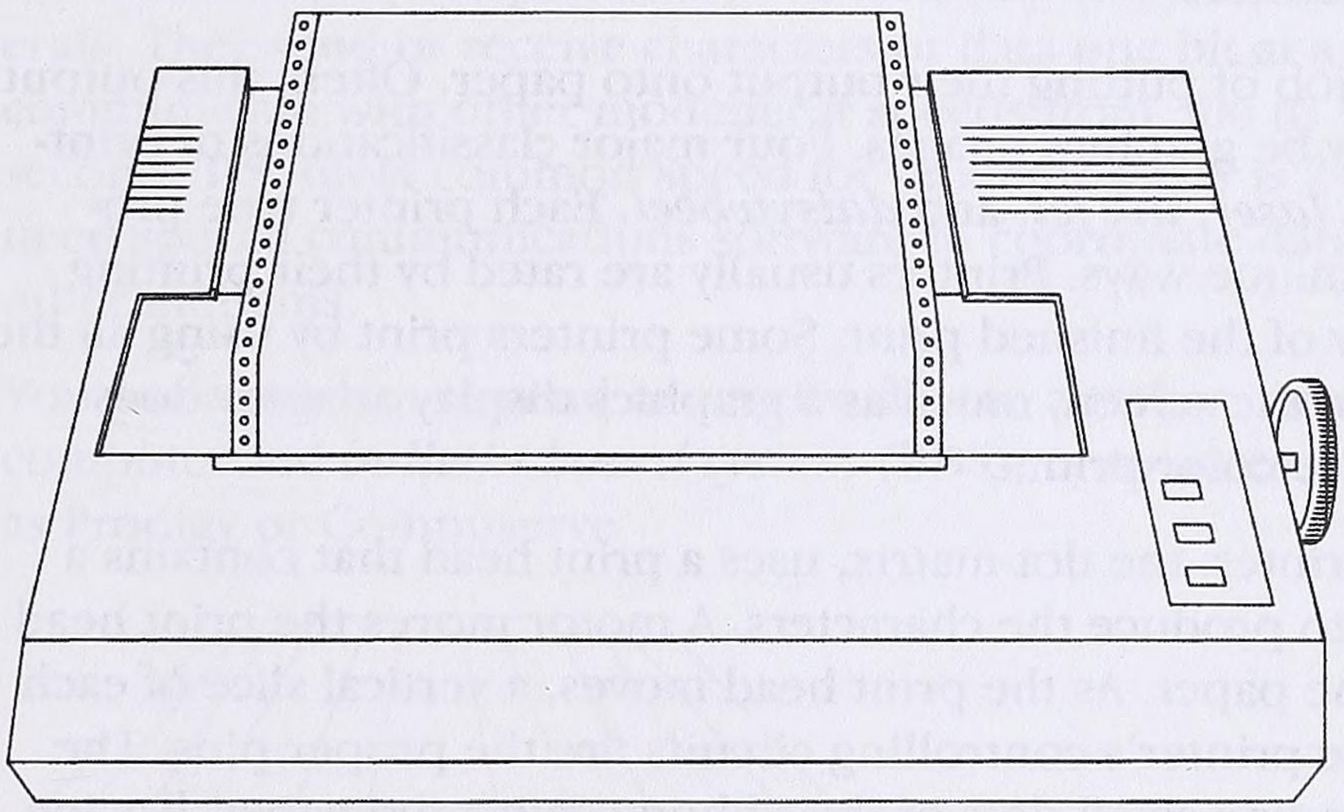
The mouse is a pointing device that moves on the surface of your work space and causes the computer to correlate this movement to the display. The mouse is shaped to fit comfortably under your hand. The contour and the cable that trails from the unit give the vague appearance of a mouse sitting on the table. The mouse has two or three buttons that rest beneath the fingers of your hand.

You use the mouse to move a *mouse cursor* to make menu selections, draw with graphics programs, move the keyboard cursor swiftly, and select sections of your work to manipulate. Not all software supports a mouse, but many popular programs do. Although mouse functions in different programs can vary, the standard mouse techniques are based on Microsoft Windows. These mouse techniques are also found in the DOS shell.

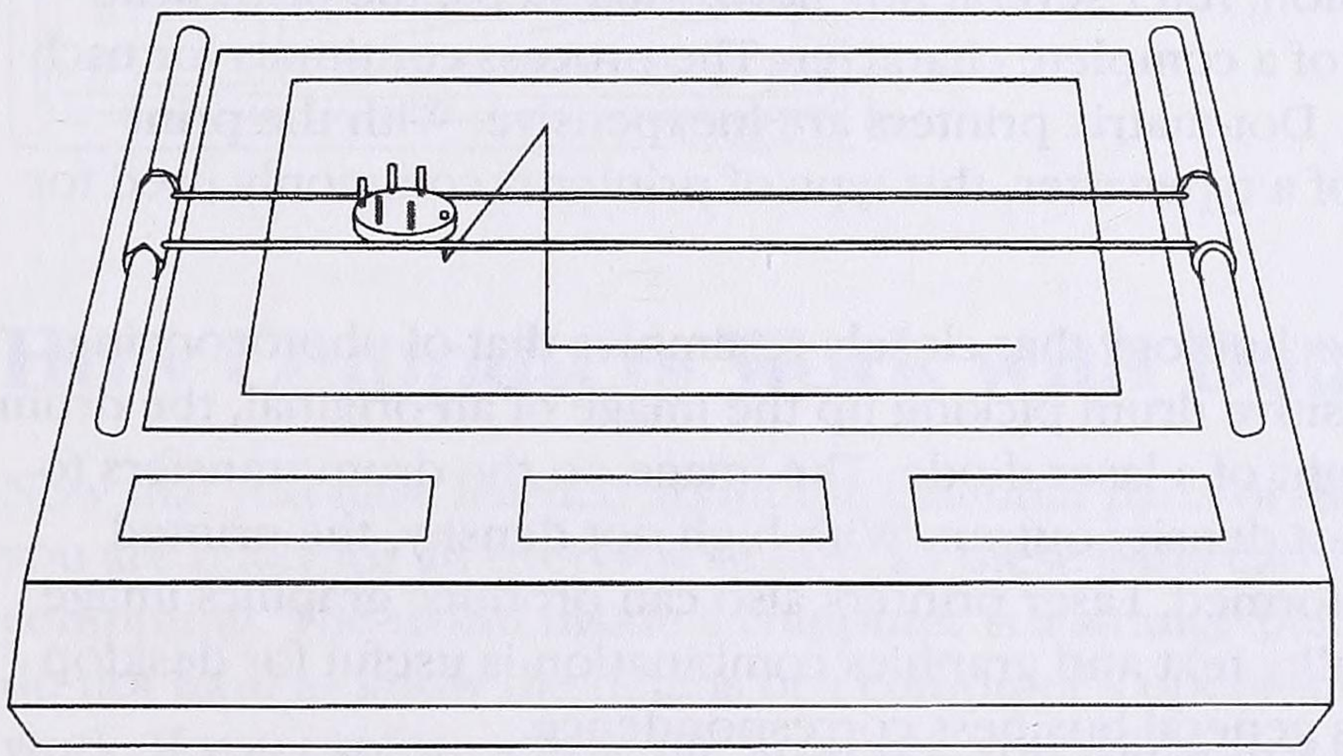
Printers

Printers accept signals (*input*) from the CPU and convert those signals to characters (*output*), usually imprinted on paper. You can classify printers in the following ways:

- By the way they receive input from the computer
- By how they produce output



A printer accepts data from the computer and renders it as text and images on paper.



A plotter lets you draw with the computer. Unlike the printer, a plotter draws up and down as well as back and forth.

You connect printers to the system unit through a *port*. A port is an electrical doorway through which data flows between the system unit and an outside peripheral. A port has its own expansion adapter or shares an expansion adapter with other ports or circuits, such as a multi-function card.

The terms *parallel* and *serial* describe two types of ports that send output from personal computers to printers. A parallel port continuously sends all the bits of data synchronously, through separate wires in the cable, one byte (character) at a time. Parallel printer connections are more common than serial connections. A serial port delivers the bits of data, one bit after another, in single-file fashion. Although sending one complete byte (character) by using serial communications takes longer, serial ports require fewer wires in the cable. Serial printers also can communicate with the port over longer distances than parallel printers.

All printers have the job of putting their output onto paper. Often, this output is text, but it also may be graphics images. Four major classifications of printers exist: *dot-matrix*, *laser*, *ink jet*, and *daisywheel*. Each printer type produces characters in unique ways. Printers usually are rated by their printing speed and the quality of the finished print. Some printers print by using all the addressable points on the screen, much as a graphics display adapter does. Some printers produce color prints.

The most common printer, the dot-matrix, uses a print head that contains a row of pins or wires to produce the characters. A motor moves the print head horizontally across the paper. As the print head moves, a vertical slice of each character forms as the printer's controlling circuits fire the proper pins. The wires press corresponding small dots of the ribbon against the paper, leaving an inked dot impression. After several tiny horizontal steps, the print head leaves the dot image of a complete character. The process continues for each character on the line. Dot-matrix printers are inexpensive. With the print quality close to that of a typewriter, this type of printer is commonly used for internal reports.

Laser printers use a technology that closely resembles that of photocopying. Instead of a light-sensitive drum picking up the image of an original, the drum is painted with the light of a laser diode. The image on the drum transfers to the paper in a high dot density output. With high dot density, the printed characters look fully formed. Laser printers also can produce graphics image output. The high-quality text and graphics combination is useful for desktop publishing, as well as general business correspondence.

The ink jet printer literally sprays words and graphics on a page in near-silence. Moderately priced, the print quality rivals that of a laser printer, and of all the printers, only a laser is faster and sharper than this high-resolution printer.

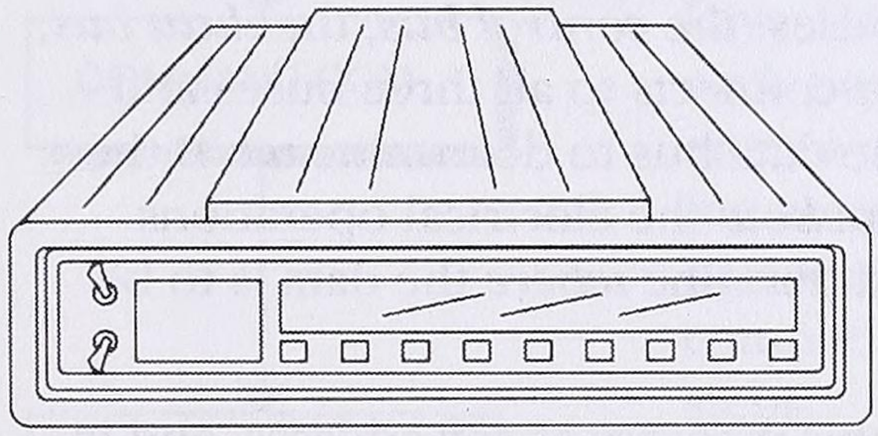
The daisywheel printer steps a print head across the page and produces a complete character for each step. The characters of the alphabet are arranged at the ends of "petals" that resemble spokes on a wheel. The visual effect of

this wheel is similar to a daisy's petals arranged around the flower head. Because the daisywheel prints fully-formed characters, the quality of daisywheel printing is about the same as a typewriter. Daisywheel printers are far slower than the other printers and are virtually obsolete.

Modems

A modem is a peripheral that helps your PC communicate with other computers over standard telephone lines. Modems are serial communications peripherals. They send or receive characters or data one bit at a time. Most modems communicate with other modems at speeds from 300 to 9600 bps, or bits per second. The most common speed for modems today is 2400 bps. Modems need special communications software to coordinate data exchanges with other modems.

You use a modem to send or receive files to another computer, to use a computerized *bulletin board system* (BBS), or to access an online service such as Prodigy or Compuserve.



A modem transfers signals between computers by using telephone lines.

How Computers Work with Data

Now that you have learned about the essential parts of the computer system, you are ready for an overview of how all these parts carry out the job of computing. The world inside a computer is a strange place. Fortunately, you do not have to know the details of a computer's operation to produce finished work. If you explore a little bit, however, you will adjust more quickly to using your computer.

Computers perform many useful tasks by accepting data as input, processing it, and releasing it as output. Data is information. It can be a set of numbers, a memo, an arrow key that moves a game symbol, or anything you can imagine.

The computer translates input into electrical signals that move through a set of electronic controls. Output can be thought of in four ways:

- As characters the computer displays on the screen
- As signals the computer holds in its memory
- As codes stored magnetically on disk
- As permanent images and graphics printed on paper

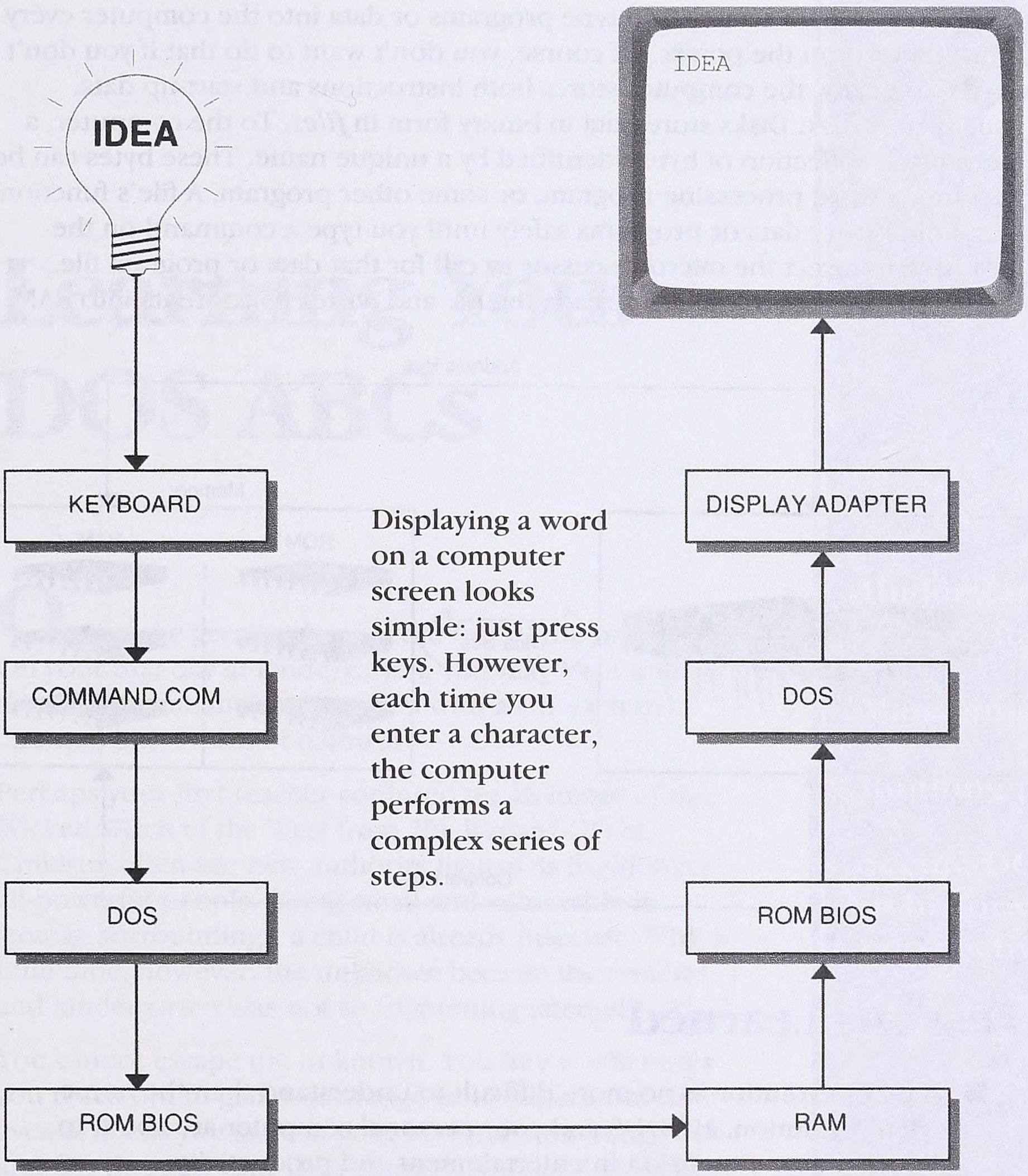
Computers receive and send output in the form of electrical signals. These signals are stable in two states: on and off. Think of these states as you would electricity to a light switch that you can turn on and off. Computers contain millions of electronic switches that can be either on or off. All input and output follows this two-state principle.

Binary, the computer name for the two-state principle, consists of signals that make up true computer language. Computers interpret data as two binary digits, or *bits*—0 and 1. For convenience, computers group eight bits together. This eight-bit grouping, or *byte*, is sometimes packaged in two-, four-, or eight-byte packages when the computer moves information internally.

Computers move bits and bytes across electrical highways called *buses*. Normally, the computer contains three buses: the *control bus*, the *data bus*, and the *address bus*. The microprocessor connects to all three buses and supervises their activity. The CPU uses the data bus to determine *what* the data should be, the control bus to confirm *how* the electrical operations should proceed, and the address bus to determine *where* the data is to be positioned in memory.

Because the microprocessor can call on this memory at any address, and in any order, it is called *random-access memory*, or *RAM*. The CPU reads and executes program instructions held in RAM. Resulting computations are stored in RAM.

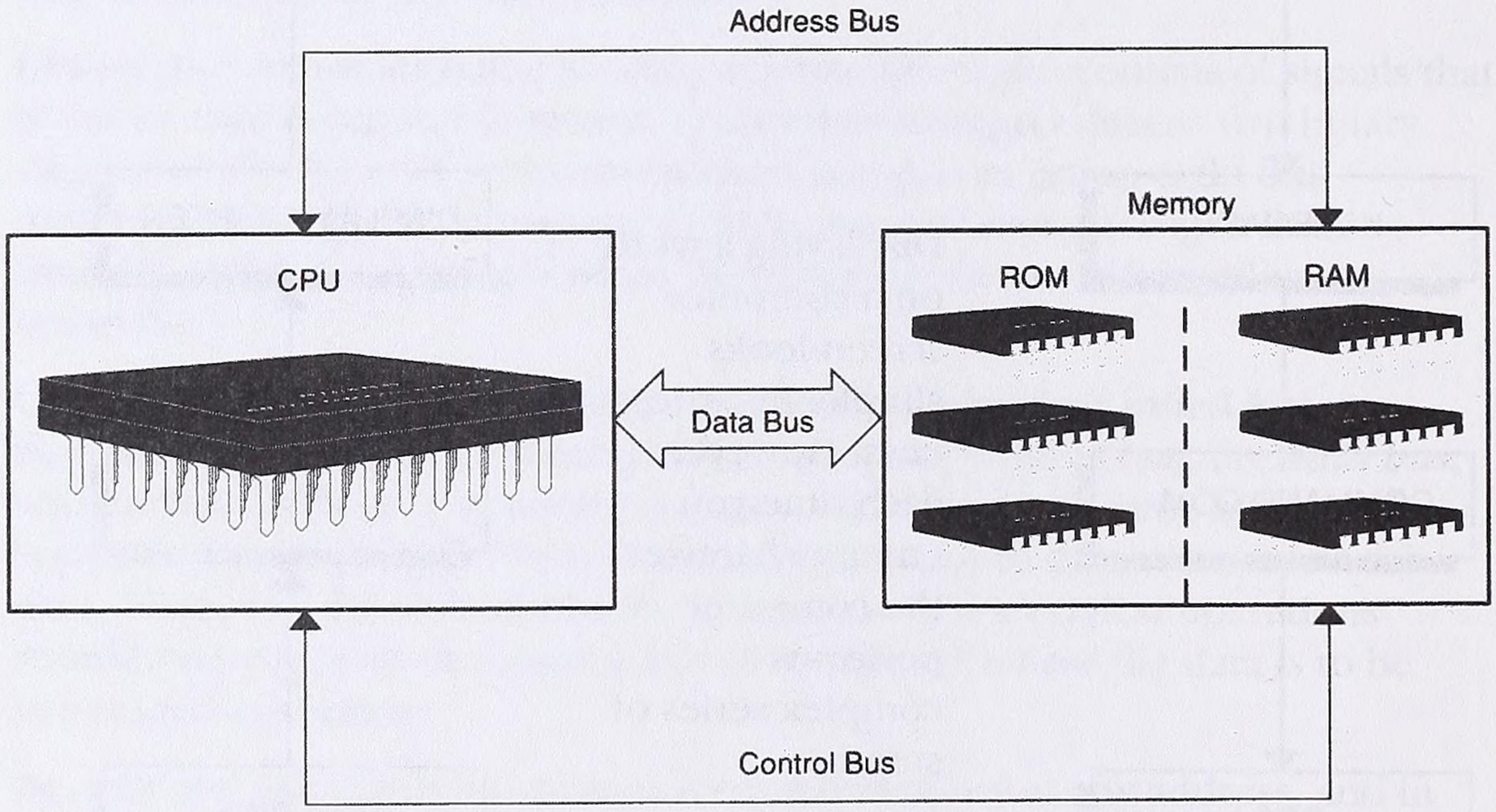
Some computer information is permanent. This permanent memory, called *read-only memory* (or *ROM*), is useful for holding unalterable instructions in the computer system.



Displaying a word on a computer screen looks simple: just press keys. However, each time you enter a character, the computer performs a complex series of steps.

The microprocessor depends on you to give it instructions in the form of a *program*. A program is a set of binary-coded instructions that produce a desired result. The microprocessor decodes the binary information and carries out the instruction from the program.

You can start from scratch and type programs or data into the computer every time you turn on the power. Of course, you don't want to do that if you don't have to. Luckily, the computer stores both instructions and start-up data, usually on a disk. Disks store data in binary form in *files*. To the computer, a file is just a collection of bytes identified by a unique name. These bytes can be a memo, a word processing program, or some other program. A file's function is to hold binary data or programs safely until you type a command on the keyboard to direct the microprocessor to call for that data or program file. When the call comes, the drive reads the file and writes its contents into RAM.



Lessons Learned

- The PC revolution is no more difficult to understand than the home video revolution. MS-DOS and your personal computer are about to unlock a new dimension in entertainment and productivity.
- If you feel comfortable with a computer, you can accept and enjoy all that goes with it, just like your VCR.
- The PC on your table, desk or floor is a product of years of development and more than one company's efforts.
- Computer terminology is simple. The words are basic, and the definitions are easy to understand.
- Hardware, software, screen displays, keyboards, disks, drives, mice, modems, and memory are the tools of microcomputer technology.

The next chapter teaches you the computing ABCs.

2

Learning Your DOS ABCs

Understanding files and what they do

Managing disks

Running programs

Seeing DOS in historical perspective

One of the greatest fears is the fear of the unknown. On your first day at kindergarten, you may have walked down those unfamiliar corridors with a stomach that churned like a mass of oatmeal.

Perhaps your first teacher conjured up an image of the Wicked Witch of the West from *The Wizard Of Oz*. Children often see new authority figures as frightening, all-powerful people. Being small and vulnerable in strange surroundings, a child is already insecure. With a little time, however, the unknown became the familiar and kindergarten was not so frightening after all.

You cannot escape the unknown. You face it whenever you reach out to gain knowledge or to experience new events. So, as you stare at your new personal computer and flip through your DOS manual, you need not fear that the computer screen will dissolve into a churning fog and then clear to reveal the Wicked Witch of the West.

Computers can add a new and pleasurable dimension to your life. Believe it or not, the classic "hero" and friend who helps you through this fear of the unknown is the *disk operating system*, or *DOS*. DOS is a product of ingenuity. At first, it may feel distant and overpowering, but many heroes present that image. Soon DOS will feel familiar and you will lose your fear of this unknown.

2

Chapter 1 discussed software, mechanics, computer systems, and component parts. This chapter introduces DOS, the most important link between hardware, other software, and you. It brings DOS closer to you by defining the disk operating system, its uses, and its interesting history. After all, even heroes have a past.

Key Terms Used in This Chapter

Program	Instructions that tell a computer what to do, and how to do it.
BIOS	Basic Input/Output System. The program that performs basic communications between the computer and the peripherals.
Applications program	Instructions that tell the computer to perform a program-specific task, such as word processing. It's a "how to" for the computer.
Interface	A connection between parts of the computer, particularly between hardware devices. Also, the interaction between you and an applications program.
Command	An instruction that you give to DOS to perform a task.
Batch file	A series of DOS commands placed in a disk file. DOS executes batch-file commands one at a time.

What is an Operating System?

An operating system is a collection of computer programs that provides special services to other programs and to the user of a computer. DOS unleashes the potential of your computer by translating into action, through commands, your desire to manipulate data. You, or a program, tell DOS what action you want to take, and DOS directs the hardware to carry out your wishes.

If you think of the computer hardware as a theater's empty stage, and an applications program as an ongoing play, you can see the void between them. Behind the scenes are many supporting characters.

Operating system software does the computer-equivalent job of the set-preparation crews, the lighting crews, the stage hands, the makeup artist, and even the janitor. All the services that must bridge the gap between the hardware and the program are performed by the operating system software. The program is not burdened with routine details. Can you imagine the lead actress having to push her own backdrop onto the stage just before the curtain goes up?

Imagine yourself as the producer/director. You have full control over the stage (hardware) and stage crew (operating system), and which plays (applications programs) you will produce. You now have a good idea where you fit into the equation.

If a computer's operating system did not supply these services, you would have to deal directly with the details of controlling the hardware. Without the disk operating system, for example, every computer program would have to hold *instructions* telling the hardware each step to take to do its job.

Because operating systems already contain instructions, you or a program can call on DOS to control your computer. Disk operating systems get their name from the attention given to the disks in the computer system.

IBM-compatible personal computers use MS-DOS, the disk operating system developed (though not invented) by Microsoft Corporation. Manufacturers of some personal computers—such as Zenith, IBM, and COMPAQ—modify MS-DOS for their computers. These firms place their own names on the disks and include different manuals with the DOS packages they provide. Some firms add a modified utility program or two as an improvement, but all DOS versions are similar once they are loaded into a personal computer.

When you read about DOS in this book, you can assume that the information is generalized to cover your manufacturer's version of DOS. In special cases, differences are noted. As in Chapter 1, the terminology is simple. DOS is not mystical; it is designed to simplify your relationship with your personal computer.

Understanding DOS Files

The files on your disks can be divided into a variety of categories. The file name can help you determine what type of file it is.

A file name can be as long as eight characters or as short as one character. You also can add a period and a three-character extension to the file name: SADIE.LET, for example. In many cases, you choose the file name and the program adds the file extension.

Over the years, a kind of shorthand has developed to simplify identification of computer files. This identification appears as the extension at the end of the file name.

Programs are files that contain computer instructions. Most of the DOS files represent programs. When you buy an *application program*, you are buying computer instructions to perform certain tasks, such as word processing or spreadsheet manipulation. A program file is called an *executable file* because in computer lingo, to run a program is to *execute* it. Executable files usually have an .EXE file extension.

A *command file* is an executable file in a special format. A command file has a .COM file extension. Some of the DOS program files have .EXE file extensions and others have .COM file extensions. Ignore the different extensions, and treat both types of files as programs.

Text files are created by a word processing or text editing program. Text files usually have a .TXT or .DOC file extension. A text file might be a letter written to your Aunt Sadie in Podunk. Another kind of text file is the one that comes with most software. Often, the file is titled README.DOC. Usually, this file supplies additional instructions for the program that were not included in the printed manual.

Many other types of files and file formats exist. Application programs may have their own special formats and file extensions. The types of files and file extensions used by DOS are listed in the next section.

What Different Files Do

Table 2.1 shows some examples of the files that make up DOS.

Table 2.1
The Files that Make Up DOS

File name	*Description*
COMMAND.COM, FORMAT.COM, EDIT.COM, MIRROR.COM	The COM file extension identifies a *command* file.
EGA.CPI, LCD.CPI	Files with CPI extensions operate the display screen.
CATAPULT.BAS	A program written in the BASIC language ends in BAS. Many games are written in BASIC.
AUTOEXEC.BAT	A batch file has the file extension BAT. DOS looks for this batch file and runs it automatically when you start your computer.
BACKUP.EXE, MEM.EXE,	Executable program files end with RESTORE.EXE, CHKDSK.EXE, EXE.
DOSSHELL.HLP, EDIT.HLP	HLP files display on-screen assistance.
DOSSHELL.INI	INI files are initiation files that contain program default information.
KEYBOARD.SYS, CONFIG.SYS, ANSI.SYS	SYS files are system files. They are also called device drivers.

If you ask DOS for a listing of the files contained on a disk, the dot for the extension does not appear. DOS manuals don't explain, but certainly the roots of this curious behavior are sunk deep in the antiquity of DOS folklore.

What a file listing looks like on screen:	*What file names really look like:*
COMMAND COM	COMMAND.COM
EGA CPI	EGA.CPI
AUTOEXEC BAT	AUTOEXEC.BAT
FIND EXE	FIND.EXE
SELECT HLP	SELECT.HLP
DOSSHELL INI	DOSSHELL.INI
KEYBOARD SYS	KEYBOARD.SYS

The Three Parts of DOS

DOS has these three main functional components:

- The command interpreter
- The file and input/output system
- The utilities

These components are contained in files that come with your DOS package. In the following sections you are introduced to the components and to their duties.

The Command Interpreter

The Command Interpreter is DOS's "electronic butler" because it interacts with you through the keyboard and screen when you operate your computer. The command interpreter also is known as the command processor and is often referred to as, simply, COMMAND.COM (command com).

When you give COMMAND.COM an instruction, it determines what you want to do and starts the program you request. COMMAND.COM also contains the most commonly used commands, such as those to list the files on a disk or copy a file.

You can give commands to COMMAND.COM in two ways. You can type a command at the *DOS prompt* or you can use the *DOS Shell*. Both techniques are demonstrated in the next chapter and explained in detail in later chapters.

When COMMAND.COM displays the *DOS prompt*, it tells you that it is ready to receive a command. When you enter a command, you are really telling COMMAND.COM to interpret what you type and to process your input so that DOS can take the appropriate action.

When you use the *DOS Shell*, you use the keyboard or a mouse to select files, commands, and programs from lists and menus. You do not have to remember the names of commands or how to spell them. The DOS Shell is much easier to use than the DOS prompt, but you cannot execute all commands from the Shell. In some cases, you must use the DOS prompt.

The File and Input/Output System

The file and input/output system is made up of so-called "hidden" files and programs that are actually part of your computer's hardware. Your computer cannot run without these special hidden files. "Hidden" files do not appear on a normal directory listing or other lists of files, and you cannot delete or copy them. These files are not hidden to trick you into thinking that they don't exist, but to protect you from accidently deleting or changing them.

The two or three hidden files (the number depends on your computer) define the hardware to the software. When you start a computer, these DOS system files are loaded into RAM. Combined, the files provide a unified set of routines for controlling and directing the operation of the computer's hardware. These files are known as the input/output system.

The hidden files interact with programs stored in special read-only memory (ROM) that is part of your computer's hardware. The special ROM is called the ROM Basic Input Output System, or *BIOS*. Responding to a program's request for service, the system files translate the request and pass it to the ROM BIOS. The BIOS provides a further translation of the request that links the request to the hardware.

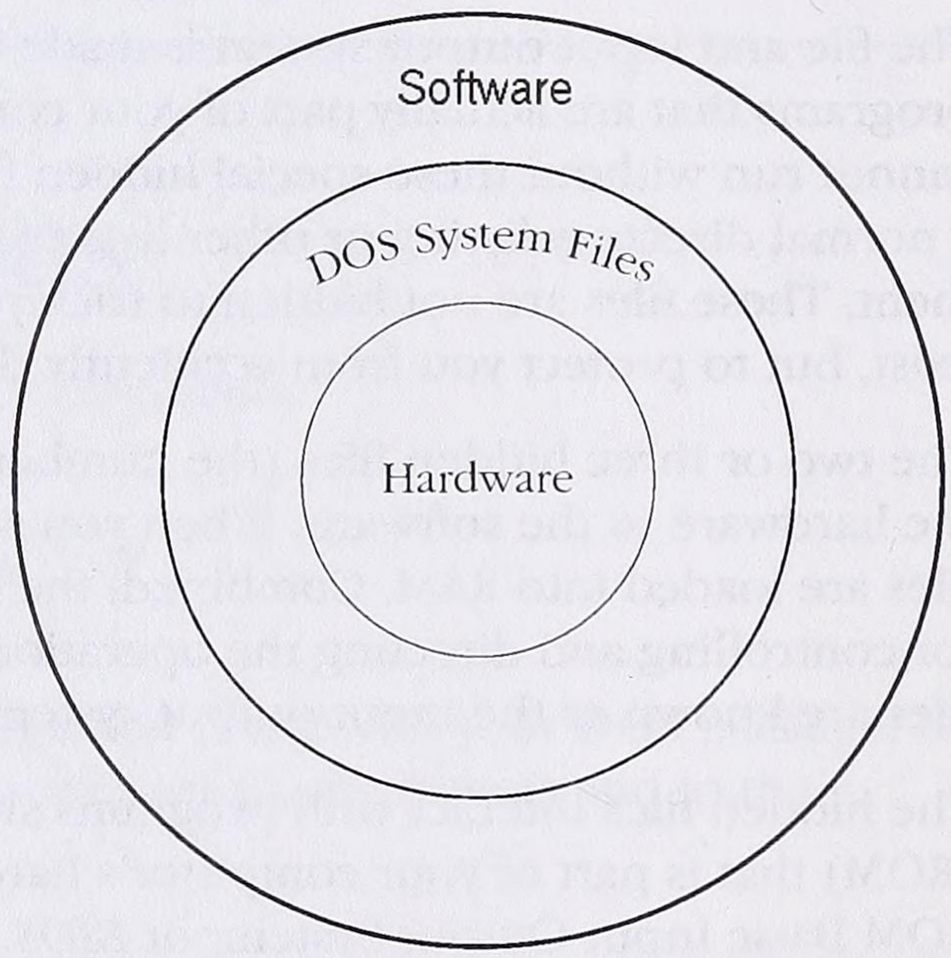
The Utility Files

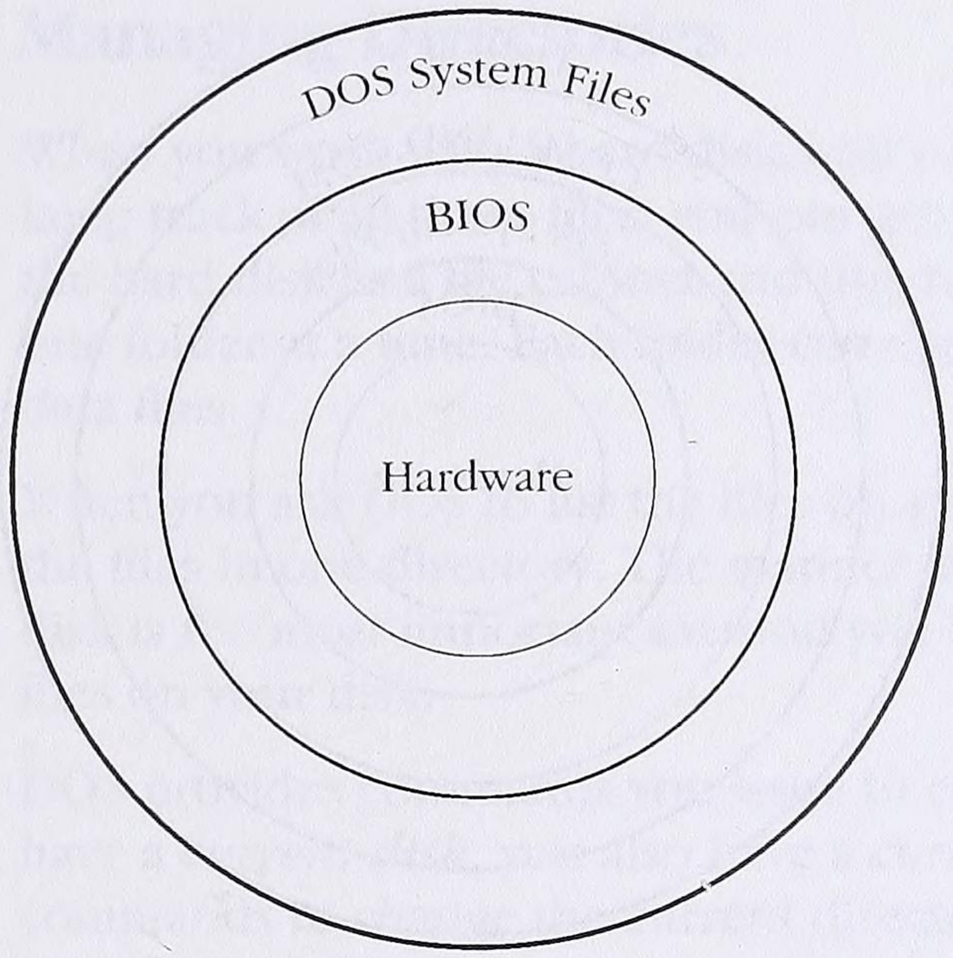
The DOS utilities are command programs that are not built into COMMAND.COM. DOS utilities carry out useful housekeeping tasks, such as preparing disks, comparing files, finding the free space on a disk, and printing in the background. Several utilities supply statistics on disk size and memory while others compare disks and files.

The utility programs are files that reside on disk and are loaded into memory by COMMAND.COM when you type their command names. These commands are often called *external* commands because they are not built into COMMAND.COM. Those commands that are built into COMMAND.COM are called *internal* commands. You do not have to be concerned with which commands are internal and which are external.

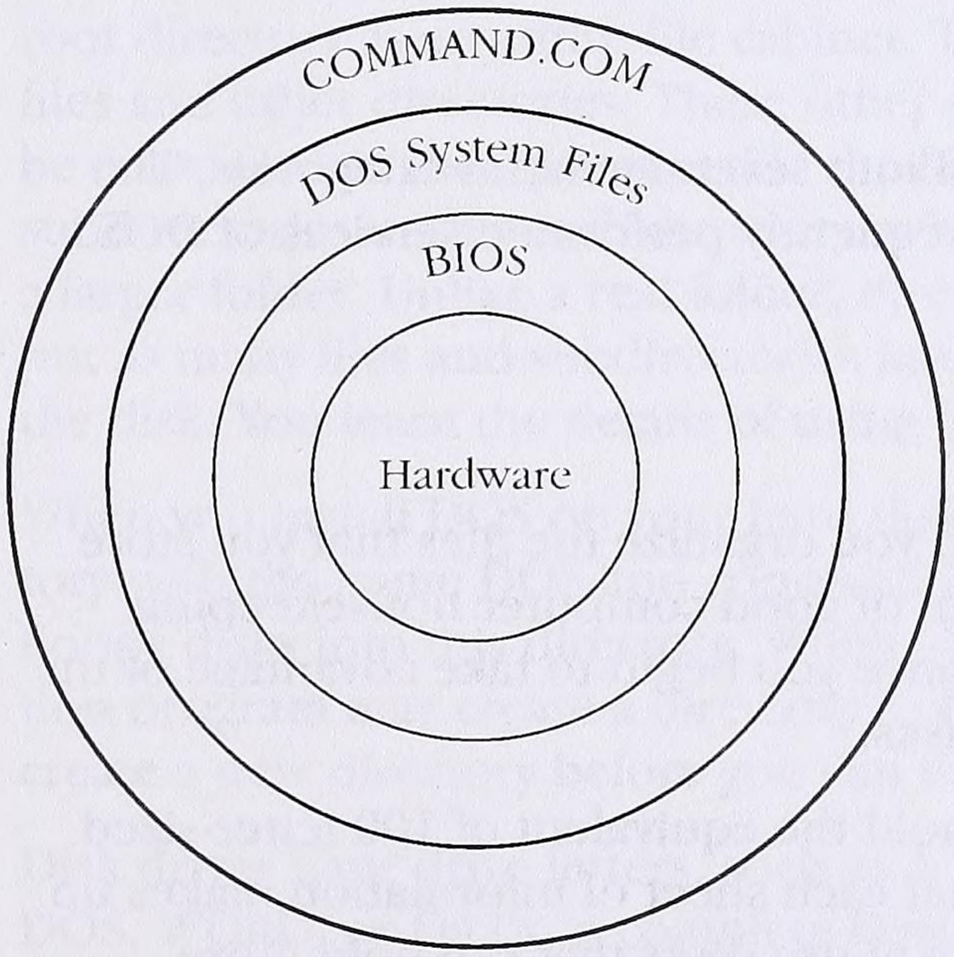
By now you may suspect that DOS makes technical moves that are difficult to understand. True, much of DOS's activity falls into a technical category, but the features you need to master to make DOS work for you are easy to understand. This section briefly describes the DOS functions you will use repeatedly as your expertise grows. Later chapters treat these topics in detail.

Disk operating systems insulate you and your programs from the need to know exactly how to make the hardware work. An example is listing the contents of a disk in a disk drive. You don't need to know the capacity or recording format of the disk or how to tell the computer to direct the output to the screen; DOS does all of this for you. Another example: applications programs that store data on a disk do not have to reserve space on the disk, keep track of where on the disk the data is stored, or know how the data is encoded. DOS takes care of all these tasks.





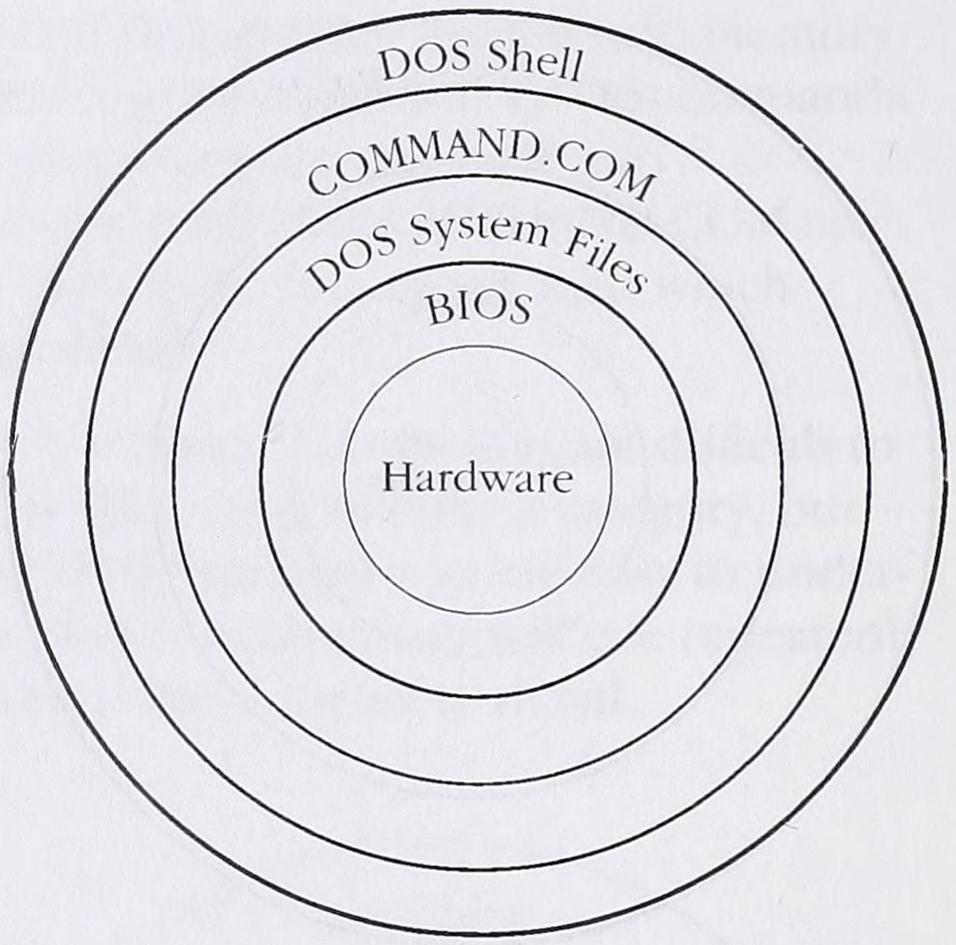
DOS provides a uniform service to the hardware by getting support from the permanent ROM BIOS in the computer. The ROM BIOS can vary among computer makers, but your computer is highly compatible if the design of the ROM BIOS is integrated with DOS.



Your communications with DOS are actually instructions to COMMAND.COM. COMMAND.COM is a special type of software that permits you to address the file and input/output systems of the computer through the keyboard. You instruct COMMAND.COM, rather than the hardware directly. You never need to know the details of how the hardware operates.

2

The DOS Shell is an easy-to-use program interface between your need for DOS services and the details of DOS commands. The Shell is a final layer that insulates you from learning how to control details of the computer's hardware.



What DOS Does

DOS's many activities can be organized into several general categories. The following sections describe the most frequently performed services of DOS.

Managing Files

One of DOS's main functions is to help you organize the files that you store on your disks. Organized files are a sign of good computer housekeeping. Good housekeeping becomes crucial once you begin to take advantage of the storage capacity available on today's disks.

The smallest-capacity floppy disk can hold the equivalent of 100 letter-sized pages of information. Now, imagine that each sheet of information makes up one file: you have 100 files to track! If you use disks that can hold more information than a standard floppy (such as a hard disk), file organization becomes even more crucial.

Fortunately, DOS gives you the tools to be a good computer housekeeper. DOS lists files, tells their names and sizes, and gives the dates when they were created or last modified. You can use this information for many organizational purposes. In addition to organizing files, DOS provides commands to duplicate files, discard outdated files, and replace files whose file names match.

Managing Directories

When you work with a hard disk, you can have thousands of files. To help you keep track of all these files, you can group these files into *directories*. Think of the hard disk as a file cabinet and the directories as a folder. You can look into one folder at a time. Each folder can contain any number of programs and data files.

When you ask DOS to list the files on your disk, you really ask DOS to list just the files in one directory. The manner in which you set up directories on your disk is the most important method you have to help you keep track of all the files on your disk.

DOS provides commands you issue to create and name directories. Just as you have a *current disk*, you also have a *current directory*. DOS also gives you commands to change the current directory when you want to work with another set of files.

The first directory on a disk is called the *root directory*. You can think of the root directory as an entire file cabinet. The root directory can contain both files and other directories. These other directories, called *subdirectories*, can be compared to the folders inside the file cabinet. You can have further subdirectories under each directory, which is like having smaller folders inside a larger folder. Unlike a real folder, directories expand automatically. You can put as many files and subdirectories into a directory as will physically fit on the disk. You learn the details of using directories in Chapter 6.

When you install DOS on your hard disk, the Install program creates a directory with the name DOS and copies all the DOS files that you need from the floppy disks into this directory. When you install other programs, the installation program may create a directory to hold the program files or tell you to create a new directory before you run the install program.

Disk drives have drive letters, such as A, B, or C. Directories have names, like DOS, WORD, or DATA. A complete listing of the drive and the directory is called a *directory path*. After you install DOS on a hard disk, the complete directory path to the DOS files is `C:\DOS`.

By using directories, you can deal with a few or a few dozen files at one time, instead of hundreds or thousands. Directories are one of the basic concepts that you need to know if you have a hard disk. Don't worry about this concept just yet. This book covers directories in detail later. After you understand how directories work, you will find them easy to use.

Managing Disks

Certain DOS functions are essential to all computer users. For example, all disks must be prepared before they can be used in your computer. This preparation is called *formatting*. You learn about formatting in Chapter 6. Other functions in DOS's disk-management category are

- Electronically labeling disks
- Making reconstructable backup copies of files for security purposes
- Restoring damaged files on disk
- Copying disks
- Checking a disk for errors

Running Applications Programs

Computers require complex and exact instructions, or *programs*, to provide you useful output. Computing would be totally impractical if you had to write a program for each job you needed to complete. Happily, this extra work is not necessary. Programmers spend months writing the specialized code that permits computers to function as many different tools: word processor, database manipulator, spreadsheet, and graphics generator. Through these programs, the computer's capabilities are applied to a task. These programs are called *applications programs.*

Applications programs are distributed on disks. DOS is the go-between that permits you access to these programs through the computer. By simply inserting a disk into a computer's disk drive and pressing a few keys on the keyboard, you have at hand a wide variety of applications. Application programs are discussed in Chapter 8.

Applications programs constantly read data from disk files to see what you have typed and to send information to the screen or printer. These input and output operations are common, repetitive computer tasks. DOS furnishes applications with a simple connection, or program *interface*, that sees to the details of these repetitive activities. As you use your computer, you may want to view information about disk files, memory size, and computer configuration. DOS provides these services. You learn about these services starting with Chapter 4.

Running Batch Files

Most of your interaction with DOS takes place through the keyboard. You type commands for COMMAND.COM to carry out. These commands also can be placed in a disk file, called a *batch file*, and "played back" to COMMAND.COM. COMMAND.COM responds to these batches of commands from the file exactly as if you typed the commands. Batch files automate often-used command sequences, making keyboard operation simpler. Hard to remember command sequences make ideal candidates for batch-file treatment. Chapter 12 teaches you how to create and use batch files.

Handling Miscellaneous Tasks

Some DOS functions fall into the miscellaneous category. One example is the setting of the computer's clock and calendar so that files and applications programs can have access to dates and times. You might need to use DOS's text editor to create text files, such as memos or notes. You even can see the amount of computer memory available for applications programs.

Knowing the Uses of DOS

When you consider that a computer won't start without DOS, it should be clear that anyone using a personal computer benefits from a working knowledge of DOS. Sure, someone may be willing to do the DOS-related work for you so that you can avoid learning about the operating system. If you learn DOS basics, however, you will become much more skilled at computing. The reward—gaining the computer's use as a productivity tool—far exceeds the effort you spend learning DOS.

In the following chapters, you will see that DOS is useful in a variety of ways. DOS contains about 100 commands and functions. This book emphasizes only those features needed to use a personal computer to run off-the-shelf programs. You can quickly become familiar with the essentials of DOS through this easy, step-by-step approach.

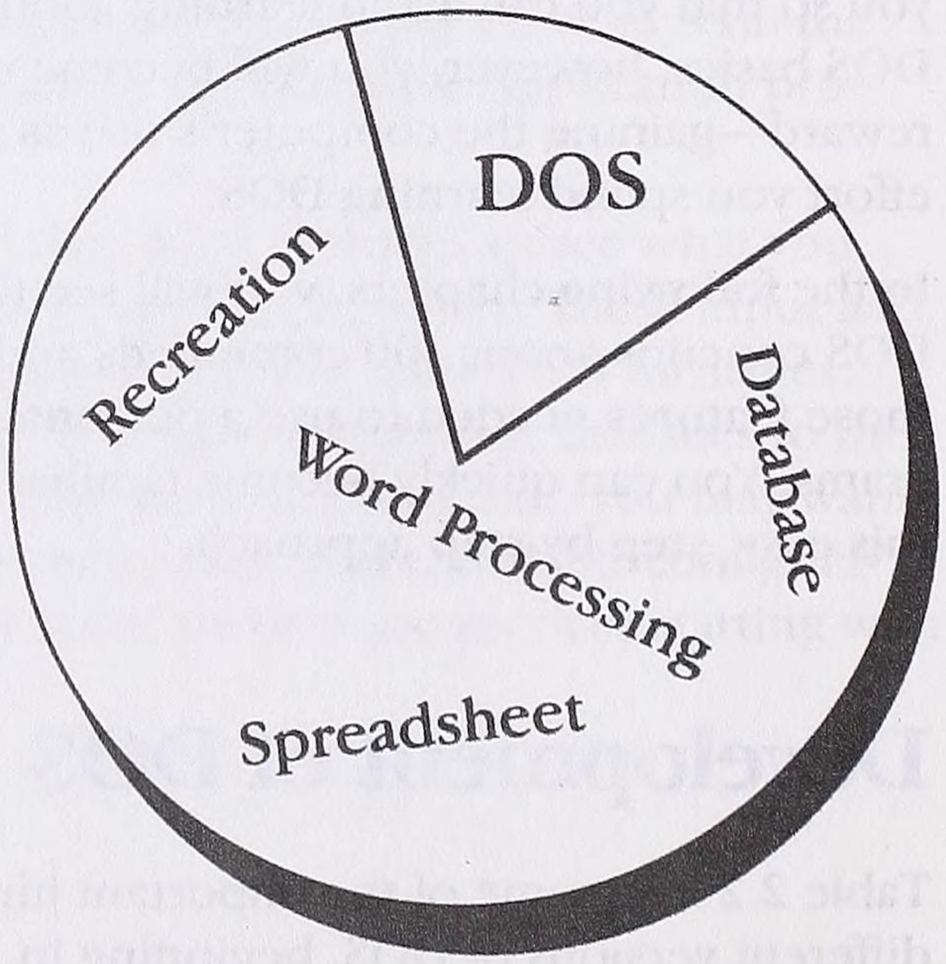
Development of DOS

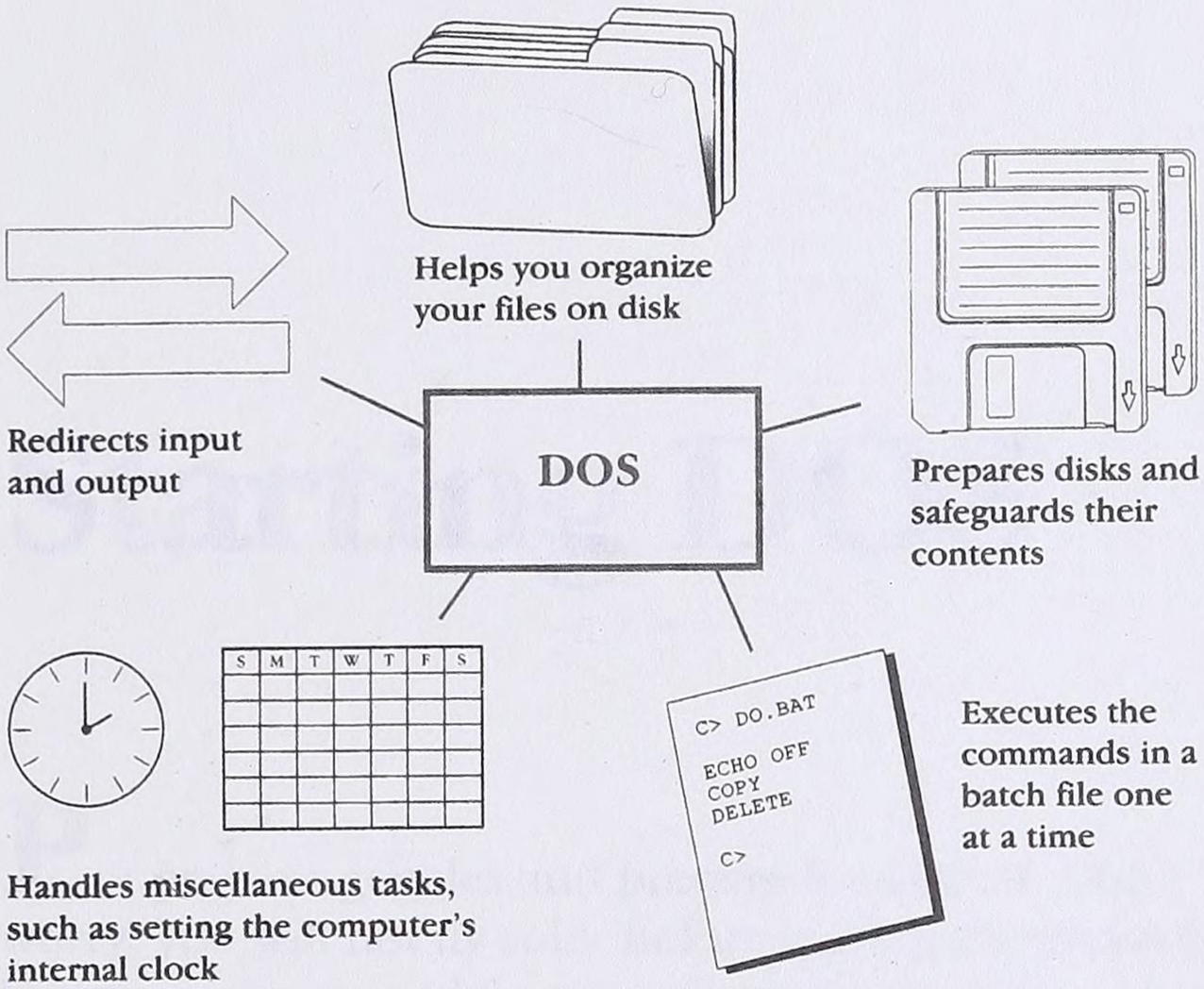
Table 2.2 lists some of the important improvements and changes among the different versions of DOS, beginning in 1981.

Table 2.2
Quick Reference to Versions of DOS

MS-DOS Version	*Significant Change*
1.0	Original version of DOS.
1.1	Accommodates double-sided disks.
2.0	Includes multiple directories needed to organize hard disks.
3.0	Support for the IBM AT and high-capacity floppy disks.
3.1	Provides support for networking.
3.2	Accommodates 3 1/2-inch drives.
3.3	Accommodates high-capacity 3 1/2-inch drives; includes new commands.
4.0	Introduces the DOS Shell and the MEM command; accommodates larger files and disk capacities.
5.0	Provides an enhanced DOS Shell with a graphical interface, on-line help, access to extended memory, full-screen editor, enhanced directory listings, and automatic installation.

Experts estimate that a typical computer user spends about 20 percent of his time using DOS. DOS facilitates the use of applications programs.




Helps you organize your files on disk
Redirects input and output
DOS
Prepares disks and safeguards their contents
S M T W T F S
Handles miscellaneous tasks, such as setting the computer's internal clock
C> DO.BAT
ECHO OFF
COPY
DELETE
C>
Executes the commands in a batch file one at a time

Helps you organize your files on disk

Prepares disks and safeguards their contents

Executes the commands in a batch file one at a time

Handles miscellaneous tasks such as setting the computer's internal clock

Lessons Learned

- Learning DOS is a task you shouldn't fear.
- Software can be divided into basic categories, which can be defined by a three-letter file-name extension.
- Files contain information stored on the magnetic surface of a disk.
- Some files hold instructions; others contain data. Other DOS files are hidden, but all are helpful.
- Batch files and the DOS Shell make it easier to use DOS.
- DOS provides your computer with "behind the scenes" assistance.
- DOS is designed to put you in full control of your PC.
- COMMAND.COM is the most efficient assistant you've ever had.

DOS is a loyal servant, and next you learn how to start DOS and see what the shell looks like.

2

3

Starting DOS

Creating a good physical environment

Booting your PC

Understanding drives, directories, and the DOS prompt

Understanding commands

Looking at the DOS Shell

Stopping your PC

Put on your goggles and prepare for takeoff. Don't worry; you will not fly solo. Before leaving the ground, however, you should first taxi around the runway a bit. That's what you will do for the next few pages as you learn the methods of operation and basic controls of your computer and DOS.

The first two chapters showed you the inside of the computer, how it and DOS evolved, and how peripherals enhance your system. This chapter explains how to get your PC up and running and covers such related topics as setting the computer's internal clock and looking at a list of files. You will find just enough definitions to keep you from being confused by DOS.

At times, you might wonder whether the time you spend learning the basics of DOS is necessary. After all, it's not as gratifying as flipping a switch or turning a key and seeing an instant physical response. Rest assured; you will find the time well invested when you gain enough computer mastery to make intelligent decisions. When you finish this book, no quick-talking salesperson or self-proclaimed DOS wizard will intimidate you.

You can consider your computer as a link in a technological chain. Now, you are going to bring your PC to life.

Key Terms Used in This Chapter

Cold boot	Starting your PC by turning on the power switch.
Warm boot	Restarting, or resetting, your PC without turning off your PC by pressing Ctrl-Alt-Del.
Cursor	The blinking line or solid block that marks where the next keyboard entry will appear.
Logged drive	The default disk drive and directory that DOS uses to carry out commands that involve disk services. Unless you change the prompt with a command, the letter of the default drive is the DOS prompt.
Prompt	A symbol, character, or characters that tells you that you must enter information before anything else can happen.
Directory	A portion of a disk. A directory is like a file folder in a file cabinet. You keep files in directories so that you can isolate a set of files to work with at one time.
Command	An instruction that you give to DOS to perform a task.
DOS Shell	A graphical menu-driven interface that enables you to execute DOS commands easily without having to learn the names of commands.

Definitions Made Simple

Most computer terms have simple origins and meanings. For example, to boot your PC means either turning on the computer (*cold boot*) or instructing the computer to reset itself without your turning it off (*warm boot*). The derivation comes from the expression, "pulling yourself up by your bootstraps."

Much of this chapter emphasizes DOS Version 5.XX, rather than earlier versions. Many experienced users, however, may still use DOS 3.3.

Incidentally, there is no DOS 5.XX. The Xs are used here to mean any refinement of DOS 5, such as 5.01 or 5.10. A reference to DOS 5 also means any version between 5.00 and a possible future version 6.00.

Software developers love the decimal-number concept. By definition, the smaller the decimal increment of a new version, the fewer refinements you will find. A jump to the next higher whole number implies a quantum leap in technology. The improvement is usually there, but occasionally the new number is simply a sales-boosting technique.

One of the most important features of DOS 5 is its improved shell. DOS 4 also contains a shell, but it was not well received. The DOS 5 shell is improved greatly. You will use the shell for most of your DOS commands.

Don't be intimidated by the term *shell*. The shell is simply a program that acts as an interface between you and DOS. Often, shells make using your PC easier, and many experienced PC owners use them. On the other hand, you cannot do everything in DOS with the DOS shell. At times you must use the command line. This book concentrates on the shell in the beginning and only uses the command line when absolutely necessary. Toward the end of the book, when you are more comfortable with using DOS, you are introduced to the command line in more detail. You then will learn some of the more advanced commands that you cannot execute from the DOS shell.

The term shell can be confusing because the command processor part of an operating system is also referred to as a shell. In this book, the term shell refers to the graphical user interface, not the command processor.

If you learn a few computer terms and the basic start-up process before you press the On button, you will feel more confident. Just remember, don't get nervous about operations that are mentioned here. More than likely, you will find the solutions with further reading or by glancing at help screens.

With early computers, operators started by entering a binary program and instructing the computer to run the program. This binary program is called a "bootstrap loader." The term *booting* stuck; even now, booting still refers to the start-up procedure. With today's DOS, the booting process is easy.

The material in this chapter assumes that you neither know how to boot you computer nor know the process that occurs during booting. Actually, booting is as simple as turning on your stereo. Right now, you probably feel more uncomfortable powering up a PC, but this situation will change.

Creating a Good Physical Environment

Before leaving the ground, a pilot runs through a checklist to affirm that the aircraft is airworthy. As a pilot's preliminary check is important, so too is a check of your computer equipment. Preliminary checks prevent later crashes.

Computers like a clean, steady current. Select a good electrical outlet that does not serve devices such as copy machines, hair dryers, or other electrical gadgets. Ask your computer dealer about a line conditioner if you must share an outlet. Unless you use your computer in a modern office building, a surge protector is cheap insurance against electrical spikes and surges. In fact, you should use a surge protector to protect all your electronic equipment, not just your computer.

Make sure that the power switch is off before you plug in your computer. Some computers have power switches marked with 0 and 1. The position marked 0 is off.

Your PC needs room to breathe. Computers must dissipate the heat that is generated by the electronic components. Keep paper, books, beverages, and other clutter away from the system unit's case and keyboard. More importantly, make sure that the cooling fan in back of your PC works properly. Electronic components and excessive heat do not mix well, especially in humid environments.

Have your DOS manual and PC system documentation nearby for reference. Most personal computers today have a built-in hard disk that contains the DOS files that are needed to boot. If you do not have a hard disk, you need your working DOS disks to boot your computer and execute DOS commands. The appendix covers installing DOS on floppy disks or hard disks. Most likely, if you have a hard disk, your computer dealer installed DOS on the hard disk, and you can skip the installation instructions in the appendix.

Following good work habits in an unfamiliar environment can save you a lot of grief. It is comparable to telling drivers to wear a seat belt, although the belt may feel uncomfortable initially.

Booting Your PC

If your computer supplier installed DOS on your hard disk, you can boot automatically from the hard disk by simply turning on the computer. However, you still should learn to boot from a floppy disk. If you have problems with your hard disk or you make an error when you try to customize DOS on your hard disk, you might lose the ability to boot off the hard disk. You should have a floppy disk available that you can use to boot.

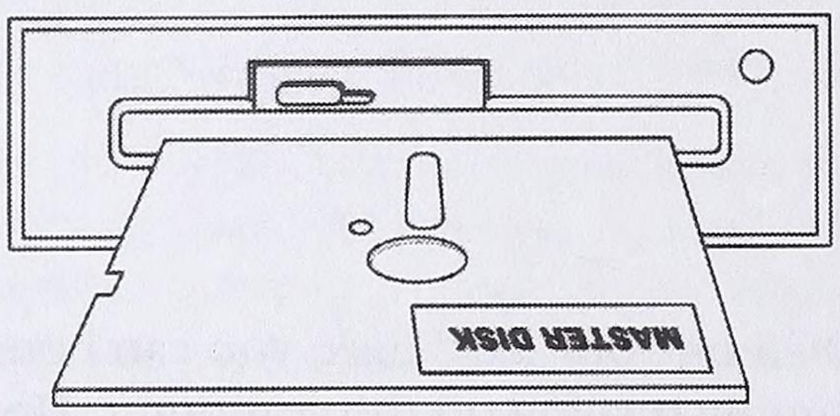
If you are using DOS 5, the disk that boots your computer is labeled "Startup." If you are using another version of DOS, the boot disk might be called "System," "Main," or "DOS." Check your manual if you are uncertain which disk is bootable, or ask your computer specialist for a bootable DOS system disk. From here on, the bootable DOS disk is called the DOS Master disk.

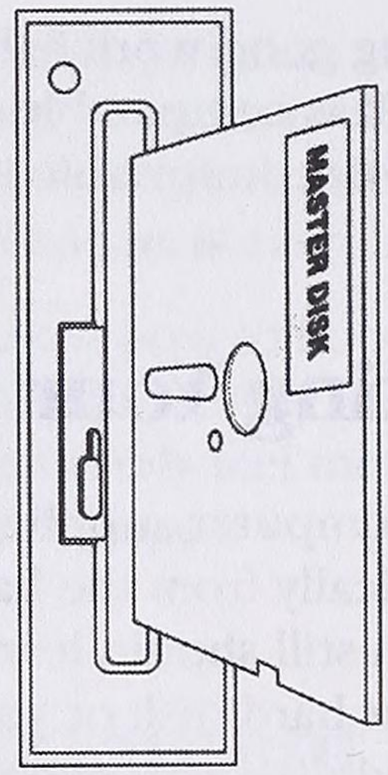
The Cold Boot

The cold boot consists of two steps: inserting the floppy disk into drive A and turning on the computer's switch. In addition, if you have a lock on the front of the system unit, you need to unlock the unit. Very few people ever use this lock.

Insert the DOS Master disk into drive A. Check your PC's system manual for the location of drive A and for disk-insertion instructions. Depending on your system unit's configuration, drive A is the left slot (for vertically positioned drives) or top slot (for horizontally positioned drives) in the system unit's cabinet. A properly inserted disk usually has its label facing to the left on vertical drives and up on horizontal units.

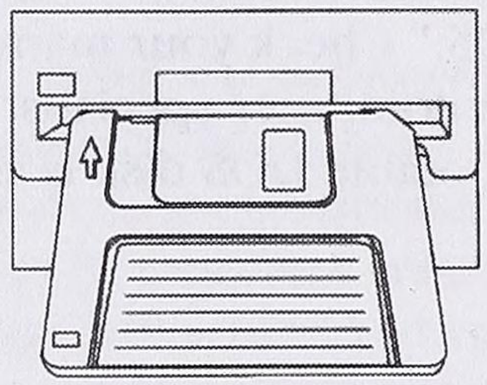
You insert disks into horizontal and vertical drives in the same way. To finish inserting a 5 1/4-inch disk, close the drive door or turn the latch clockwise.





Drives may be mounted horizontally or vertically.

Insert 3 1/2-inch disks gently, pushing until you hear a click. The drive closes by itself.



If the disk does not go in, make sure that the drive doesn't already hold another disk. Never force a disk into the drive door because you could damage the disk, the drive, or both.

After inserting the disk, close the drive door (3 1/2-inch floppy drives close themselves).

Turn on the display switch, if necessary. Some displays are powered from the system unit and do not have a switch. Locate the computer's power switch. On older computers, the power switch usually is on the right side and toward the rear of the system unit. The IBM PS/2 power switch is located conveniently in the front. Turn on the switch. At this point, the cold boot begins.

What Booting Looks Like

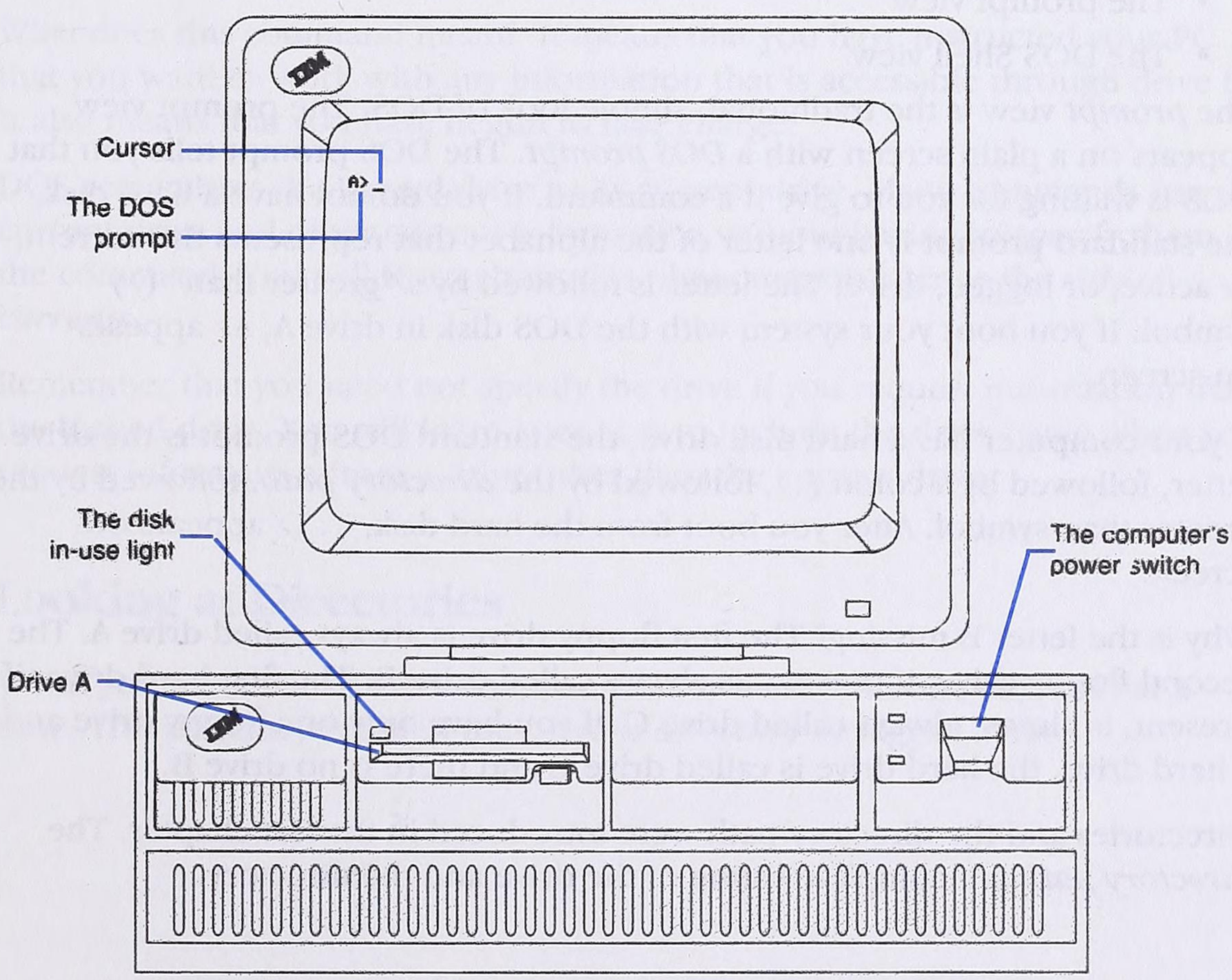
The instant that you flip the switch, the computer performs a Power On Reset (POR). The RAM, the microprocessor, and other electronics are zeroed out, like a chalkboard cleaned with an eraser.

The system then begins a Power-On Self-Test (POST). POST ensures that your PC's electronics are working properly. The POST takes from a few seconds to several minutes to complete. During POST, you may see a description of the test or a blinking cursor on the display. When the POST ends, the computer beeps and drive A spins. Finally, a bootstrap loader loads DOS from the Master DOS disk into RAM.

If drive A does not contain disk and you have a hard disk, the bootstrap loader loads DOS from the hard disk. If drive A does contain a disk, the bootstrap loader tries to load DOS from the disk in drive A, even if you have a hard disk. If you have a hard disk, do not try to boot the computer with a disk in drive A.

Some computers permit you to watch the action of the power-on-self-test (POST). The test verifies that the computer is working properly.

When DOS completes loading, the DOS prompt, or command prompt, appears. The DOS prompt is a letter and the "greater-than" (>) symbol that represents the current, or active, drive. You can enter DOS commands when the command prompt appears.



The Warm Boot

The warm boot differs little from the cold boot. For the cold boot, you inserted the DOS system disk if necessary and then switched on the computer. For the warm boot, your PC is already running. Make sure that your DOS system disk is in drive A, or that the operating system is installed on hard disk drive C. You then press three keys simultaneously.

Look at the keyboard and locate the Ctrl, Alt, and Del keys. The warm boot requires pressing and holding Ctrl and Alt and then pressing Del. The PC skips the preliminary tests and immediately loads DOS. Don't worry if nothing happens on the first try. With some systems that have run programs, you may have to use Ctrl-Alt-Del twice.

Looking at DOS

A DOS Shell first appeared in DOS 4 and is improved greatly with DOS 5. This shell gives you a choice of two ways to view DOS and enter commands:

- The prompt view
- The DOS Shell view

The *prompt* view is the traditional, simple look of DOS. The prompt view appears on a plain screen with a *DOS prompt*. The DOS prompt tells you that DOS is waiting for you to give it a command. If you do not have a hard disk, the standard prompt is one letter of the alphabet that represents the current, or active, or logged, drive. The letter is followed by a "greater than" (>) symbol. If you boot your system with the DOS disk in drive A, `A>` appears on-screen.

If your computer has a hard disk drive, the standard DOS prompt is the drive letter, followed by a colon (:), followed by the *directory path*, followed by the greater than symbol. After you boot from the hard disk, `C:\>` appears on-screen.

Why is the letter B missing? The first floppy drive is always called drive A. The second floppy drive, if present, is always called drive B. The first hard drive, if present, is almost always called drive C. If you have only one floppy drive and a hard drive, the hard drive is called drive C and there is no drive B.

Directories and the directory path were introduced in the last chapter. The *directory path* is a complete listing of the drive and the directory.

The Current Logged Drive

The first thing that the DOS prompt tells you is the current, or *logged*, drive. Suppose that you have a computer with two floppy drives. If you want to change the current drive from drive A to drive B, type **B:** at the A> prompt. Before you press Enter, your prompt looks like this:

```
A>B:
```

After you press the Enter key, the following appears:

```
B>_
```

Enter the drive letter followed by a colon, and don't forget to press ↵Enter. DOS reads the drive letter and colon as the disk drive's name.

Once the boot is complete, the command prompt indicates the logged drive. The logged drive is the *active* drive, or the drive that responds to commands.

For example, A> tells you that DOS is logged onto drive A. The B> means that DOS is logged onto drive B. You can change the logged drive from A to B by typing **B:** at the prompt and pressing ↵Enter. Remember to type the letter B and a colon (:).

What does this command mean? It means that you have instructed your PC that you want to work with any information that is accessible through drive B. It also means that you have begun to take charge!

DOS remembers the logged drive as its current drive. Many commands use the current drive and other current information without having to specify them in the command. You will learn about this phenomenon later as the *rule of currents*.

Remember that you need not specify the drive if you request information from the logged drive. You will learn later how to include the drive name when you request information from a drive other than the current drive.

Looking at Directories

When you work with a hard disk, you usually work with one directory at a time. This directory is called the *current directory* or *logged drive*.

The standard DOS prompt with a hard disk displays the current directory path. The DOS files are copied to the C:\DOS directory during installation. The current prompt is C:\DOS>.

```
 Volume Serial Number is 1635-9ECA
 Directory of C:\DOS

[.]             [..]            EGA.SYS         DISPLAY.SYS     FORMAT.COM
PACKING.LST     ANSI.SYS        COUNTRY.SYS     HIMEM.SYS       KEYB.COM
KEYBOARD.SYS    MODE.COM        SETVER.EXE      SYS.COM         UNFORMAT.COM
DEBUG.EXE       DOSKEY.COM      EDLIN.EXE       EMM386.EXE      FASTOPEN.EXE
FC.EXE          FDISK.EXE       MEM.EXE         MIRROR.COM      MORE.COM
RAMDRIVE.SYS    SHARE.EXE       SMARTDRV.SYS    UNDELETE.EXE    GWBASIC.EXE
XCOPY.EXE       DOSSHELL.VID    DOSSHELL.INI    DOSSHELL.COM    DOSSHELL.EXE
LINK.EXE        DOSSHELL.GRB    DOSSWAP.EXE     EXE2BIN.EXE     PRINT.EXE
REPLACE.EXE     TREE.COM        DOSSHELL.HLP    EDIT.HLP        RECOVER.EXE
DOSHELP.HLP     HELP.EXE        QBASIC.HLP      EDIT.COM        MSHERC.COM
QBASIC.EXE      MONEY.BAS       REMLINE.BAS     APPEND.EXE      ATTRIB.EXE
BACKUP.EXE      CHKDSK.EXE      COMP.EXE        DISKCOMP.COM    DISKCOPY.COM
FIND.EXE        LABEL.EXE       RESTORE.EXE     SORT.EXE        4201.CPI
4208.CPI        5202.CPI        ASSIGN.COM      DRIVER.SYS      EGA.CPI
EXPAND.EXE      README.TXT      NETWORKS.TXT    UMB.TXT         GRAFTABL.COM
GRAPHICS.COM    GRAPHICS.PRO    CATAPULT.BAS    NIBBLES.BAS     JOIN.EXE
LCD.CPI         NLSFUNC.EXE     PRINTER.SYS     SUBST.EXE       CLEANUP.EXE
CLEANUP.INF     COMMAND.COM     QBASIC.INI
       88 file(s)     2236223 bytes
                      3115008 bytes free

C:\DOS>
```

This display shows the files in the DOS directory. The files are displayed using the *DIR /W* (directory) command.

```
C:\DATA\TAXES>dir

 Volume in drive C is DRIVE_C
 Volume Serial Number is 1635-9ECA
 Directory of C:\DATA\TAXES

.            <DIR>      01-28-91   3:18p
..           <DIR>      01-28-91   3:18p
INCOME   WK1       3622 09-10-90   1:50p
STATEMNT WK1       3384 06-25-90   4:21p
CHECKS   WK1      37365 01-16-91   1:14p
TAXEST   WK1       5379 01-14-91   2:53p
LOG      DOC       3072 06-18-90  11:41a
        7 file(s)      52822 bytes
                     3053568 bytes free

C:\DATA\TAXES>
```

When you type **DIR /W** at the DOS prompt, DOS displays all the files in the current directory in wide format and then displays the DOS prompt to show you that it is ready for the next command.

A directory can have subdirectories under it. The complete subdirectory path shows the drive letter and all the directories to the current directory. The DATA directory is commonly used to contain data files for all application programs. Subdirectories of \DATA contain the files for each application. This directory listing displays the data files in the C:\DATA\TAXES directory using the DIR command. The complete list of all the directories on a disk is called the *directory tree*.

The First Look at Commands

You just saw the results of using the DIR command. DOS 5 has about 100 commands. Some of these commands you will use quite often. Many of them you may never use. To execute a command from the DOS prompt, you type the command and press ↵Enter. COMMAND.COM, the command processor determines whether you typed the name of a command that is built-in to COMMAND.COM. DIR is an example of a built-in, or *internal,* command. *Internal commands* are already in the computer's memory; they execute as soon as you type the command and press ↵Enter.

Whether you type a command that is not built-in, COMMAND.COM looks for a program file with the name that you type. These commands are called *external commands*. FORMAT is an example of an external command.

Most commands require more information than just the command name. For example, to copy a file, you must specify the file or files to copy and the destination where you want the files copied. Commands also may have options, such as /W command to print a directory listing with the wide option. Options or additional information that you enter after a command name are known as *parameters*. You type all this information at the DOS prompt before you press Enter. If you type the command correctly, the command executes. If you make an error, you receive an error message.

The command line, or prompt view, is very fast and easy once you know the commands and their options. But when you first start out using DOS, the DOS Shell eliminates the need to know the names of commands and the options.

Looking at the DOS Shell

The *Shell* view provides a full-screen *window* with various menus, pop-up help boxes, and graphic presentation of directories and files. You can issue standard DOS commands by using a mouse or the keyboard to point to and select pop-down menus and dialog boxes. You do not have to remember the

names of commands to use the Shell. You just select actions from menus, type answers to questions, and check off options in dialog boxes.

By the way, a mouse is almost a prerequisite for many shells, desktop publishing programs, and the latest generation of "window-style" software. If, on the other hand, you know your way around a typewriter keyboard, you can perform some functions more quickly in the DOS Shell with cursor keys.

The Shell view is the friendliest way to use DOS. For example, a directory listing is automatic when you are in the Shell. You always see a listing of the files in the current directory.

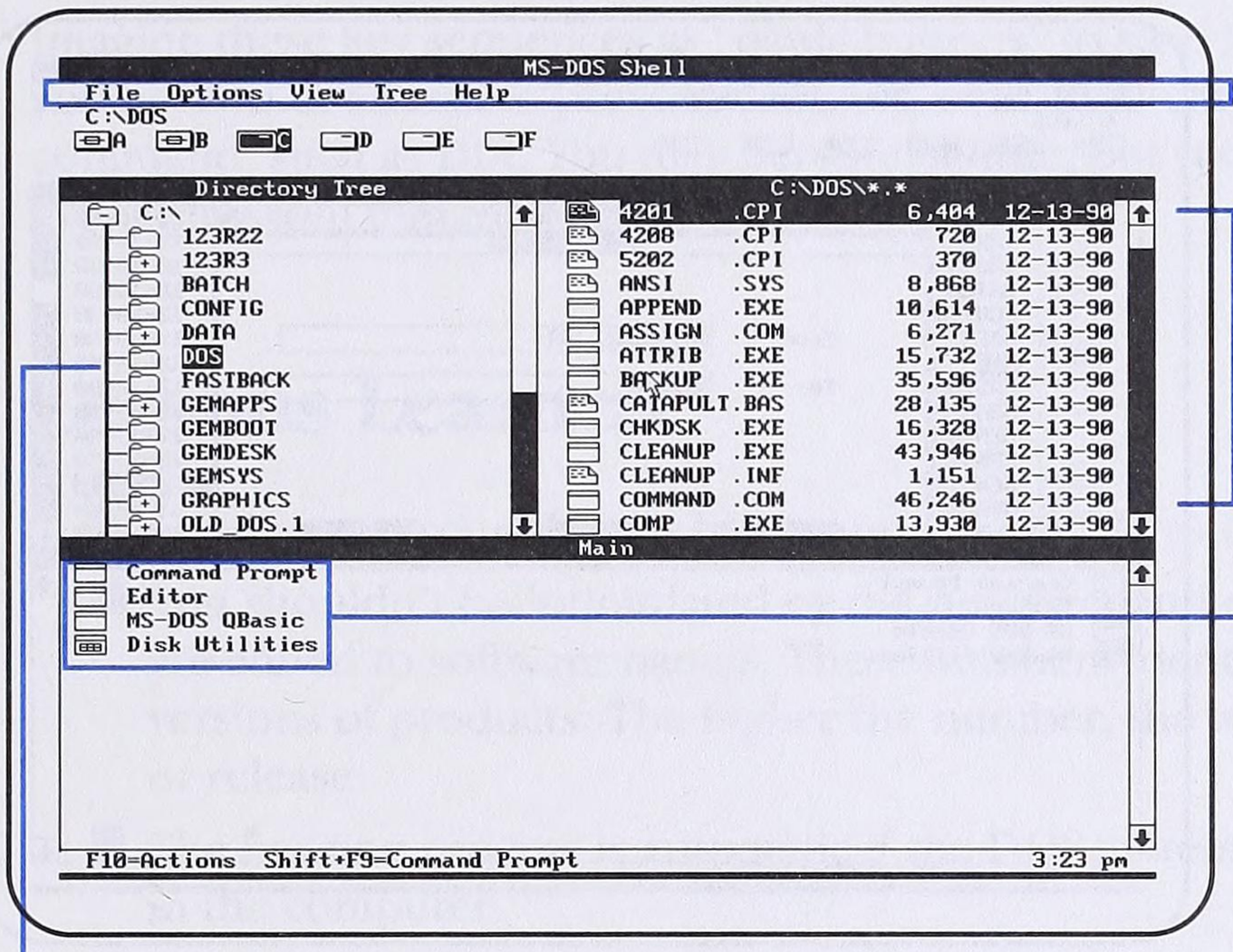
For many users, the Shell feels easier to master than DOS, but you still can profit from knowing the DOS commands and terminology. DOS 5 commands remain substantially unchanged from previous versions of DOS. The Shell is a shortcut for those who already understand the basics of DOS.

The First Look at the DOS Shell

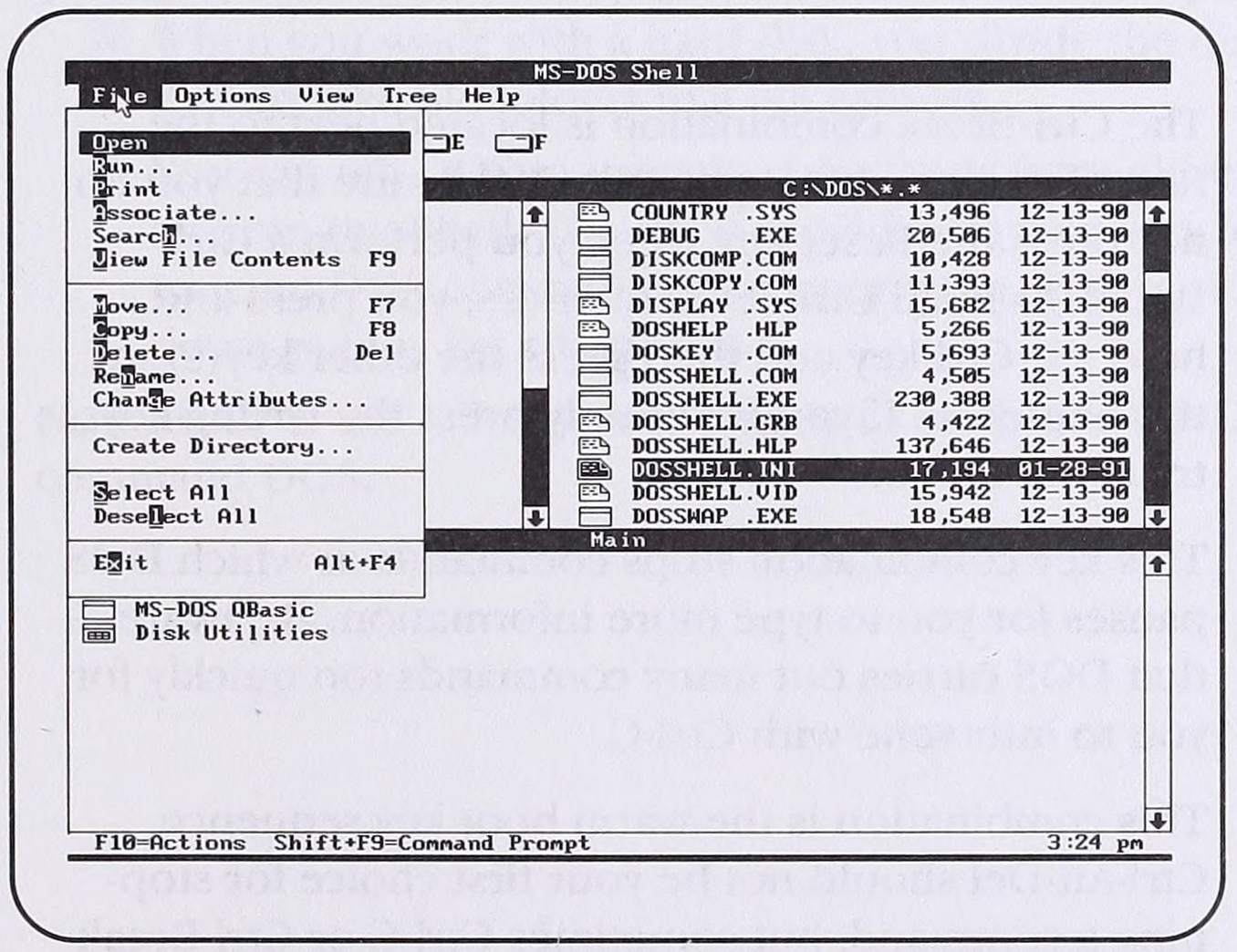
DOS's new look began with Version 4 and is improved greatly with version 5. The Shell view is a full-screen window with menus and pop-up help screens. The shell interacts with you in a manner similar to Microsoft's other mouse-and-menu products. If you have ever used Excel, Windows, or Works, the DOS Shell will be very familiar to you. If you have never used these products, you still will find the Shell very easy to learn and to use. Then, in the future, if you ever use any of these other Microsoft products, or any Windows applications, you will have a head start.

The Shell provides a visual presentation of DOS with "action options" from which you make selections. You can manage your computer from the action options, which are function- and cursor key-selectable versions of the DOS prompt-view commands.

The next chapter covers the Shell in detail. Right now you simply are taking a "first look."



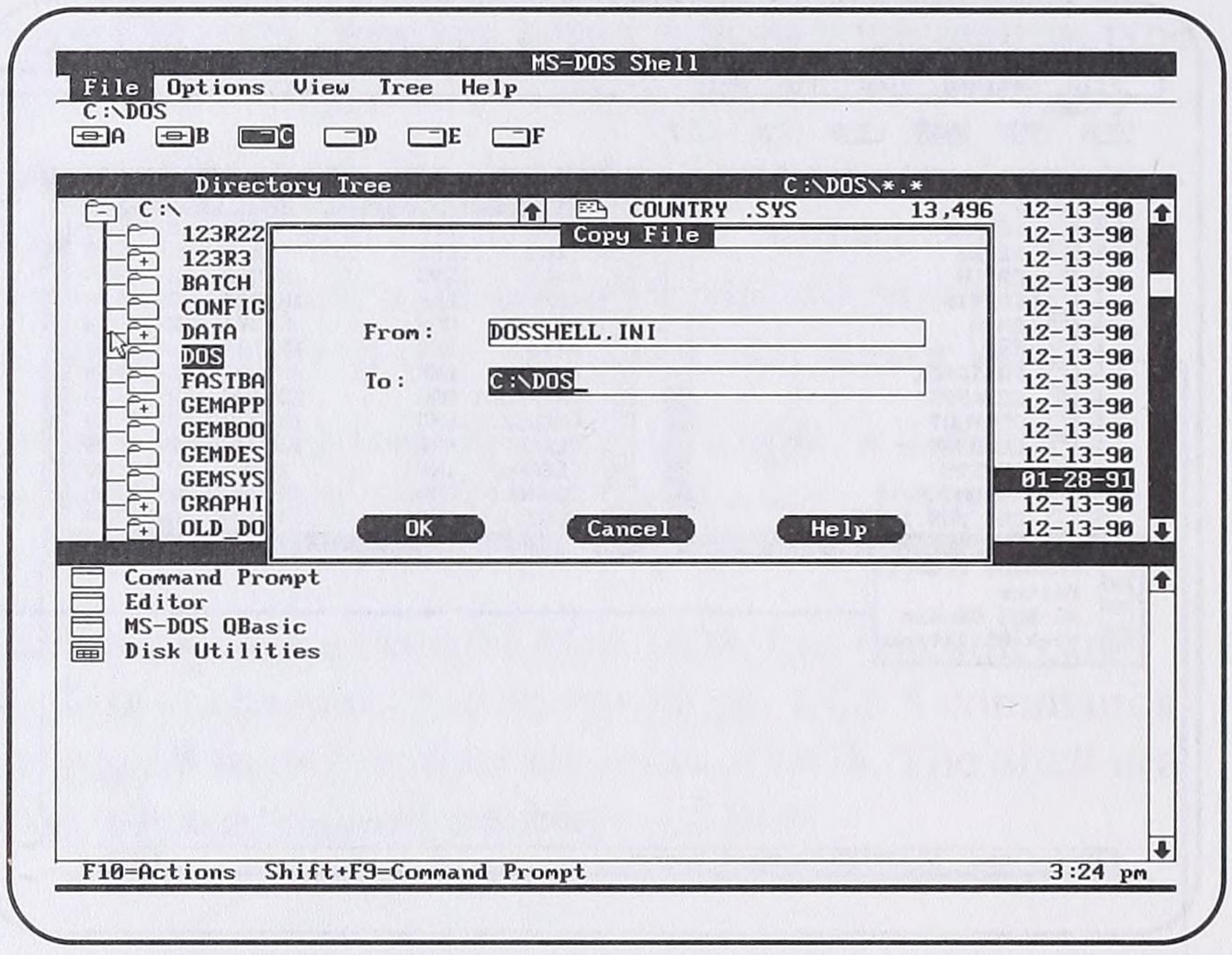
The DOS shell displays information about a disk, a directory, and programs automatically. You use a mouse or the keyboard to move around the display, to select menu items, and to execute programs.



When you make a selection from the menu, the menu commands for that selection pop down.

To move, copy, rename files or to execute other commands, you don't have to remember names of commands; you just select items from command menus.

When you need to supply more information to complete a command, DOS presents you with a *dialog box*. You type the answers to the prompts and DOS completes the command.



Stopping the Computer

Occasionally, you want to stop the computer from carrying out a command. Besides switching the power off (the last resort), you have three ways to stop a command in DOS:

Ctrl-Break — The Ctrl-Break combination is located next to the Reset key on some keyboards. Make sure that you do not press the Reset key when you perform a Ctrl-Break. As in all Ctrl-key sequences, you press and hold the Ctrl key and then press the other key(s) in the sequence. If you frequently press the wrong keys, try using Ctrl-C.

Ctrl-C — This key combination stops commands in which DOS pauses for you to type more information. Be aware that DOS carries out many commands too quickly for you to intervene with Ctrl-C.

Ctrl-Alt-Del — This combination is the warm boot key sequence. Ctrl-Alt-Del should not be your first choice for stopping a command, but sometimes Ctrl-C or Ctrl-Break doesn't work. If the Ctrl-Alt-Del approach fails, turning off the power is the last resort. Some newer computers, however, come with a Reset switch that performs the same function as Ctrl-Alt-Del.

Imagine these key sequences as "panic buttons" to stop DOS. Don't worry if you have to use them to prevent disasters. Practice them with a nondestructive command, such as DIR. You may perspire a little, but soon you will have everything well in hand.

Lessons Learned

- Computer terminology is basic, and it is simple to understand.
- You shouldn't be intimidated by the numbers and decimals that often are added to software names. These numbers identify different versions of products. The higher the number, the newer the version or release.
- The booting process is automatic if the DOS system files are on a disk in the computer.
- Providing a good environment for your computer and its software may prevent hardware failure and data loss.
- Placing XXs at the end of a product version is computer shorthand for indicating that your statements work for all versions.
- Changing the drive that you want to use is as easy as typing a letter and colon.
- When you work with a hard disk, you divide the disk into directories that are like file folders in a file cabinet.
- You can tell DOS to execute commands from either the DOS prompt or from the Shell. The Shell provides an easy way for beginners to execute DOS commands. Navigating the Shell is simple, and pull-down menus list all options.

Now firmly at the helm, you are ready to really use the DOS Shell to command DOS.

3

4

Understanding and Using the DOS Shell

Now that you have the basics of DOS under your belt, you're ready to start taking control. With the past versions of DOS, all you had were the manual, perhaps a book such as this one, and the "dreaded" DOS prompt. If you wanted your computer to do any task, you had to know which words to type and what keys to press, or nothing happened. If you made a mistake, all you got was an error message. DOS provided no help to guide you. No wonder so many people were afraid of DOS.

Now that's all changed. Once you enter the DOS Shell, you will find the power of DOS displayed in front of you. No commands to memorize or forget; no file names to remember; and help at the touch of a key.

The Shell makes DOS much easier to use. You will see the Shell in action in this chapter and you will be at the controls.

Understanding the Shell display

Using the mouse and keyboard

Using menus and dialog boxes

Getting Help

Enabling the Task Swapper

Changing the Shell views

Key Terms Used in This Chapter

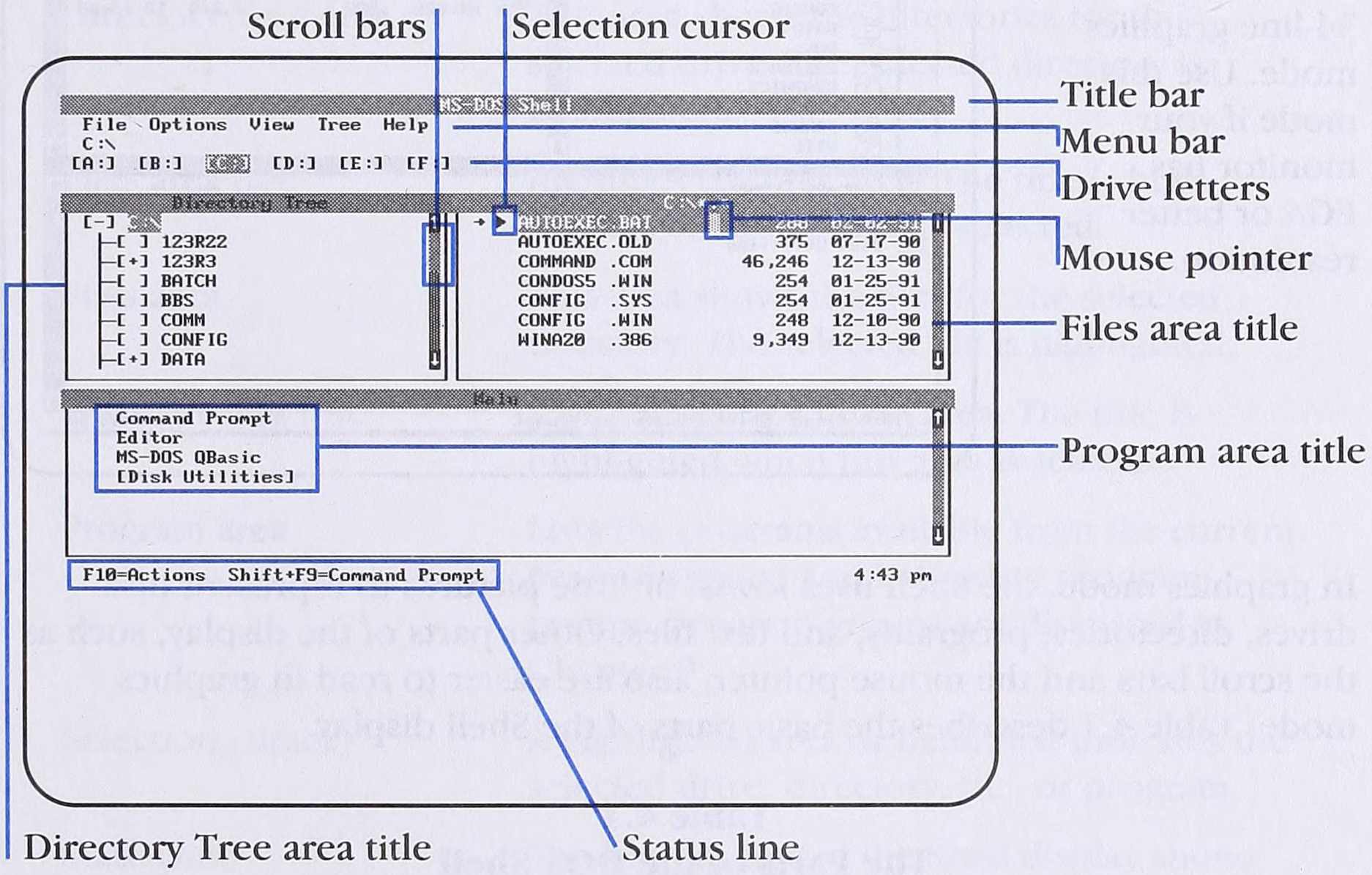
Graphical User Interface (GUI)	A graphical way to present information on the screen and accept information from the user. This is the type of interface used in the DOS Shell as well as Microsoft Windows.
Shell	The name of the interface used to operate DOS.
Icon	A small picture that represents an object, such as a file or a program, graphically.
Mouse pointer	A symbol, usually an arrow, that shows you the position of the mouse.
Click	The action of pressing the mouse button.
Double-click	The action of quickly pressing the mouse button twice.
Drag	To press and hold down the mouse button as you move the mouse.
Selection cursor	The highlighted band or area that indicates that an item is selected.
Pop-down menu	A secondary menu that pops down below the menu bar when you select a menu option.
Dialog box	A window that contains options when a command needs additional information.
Shortcut key	A key or key combination that you can use in place of a menu selection to execute a command.

Understanding the DOS Shell

When you install DOS 5, you can have the Shell load automatically. To load the Shell from the DOS prompt, type **DOSSHELL** and press ↵Enter.

The Shell displays information about your files and programs. You can choose from a number of different ways or *views* to display this data.

When you start the DOS Shell, you see a full-screen display. This display contains much information that is displayed automatically. The display shows you the list of disk drives in your computer, the files in the root directory, and a list of some of the DOS programs available.

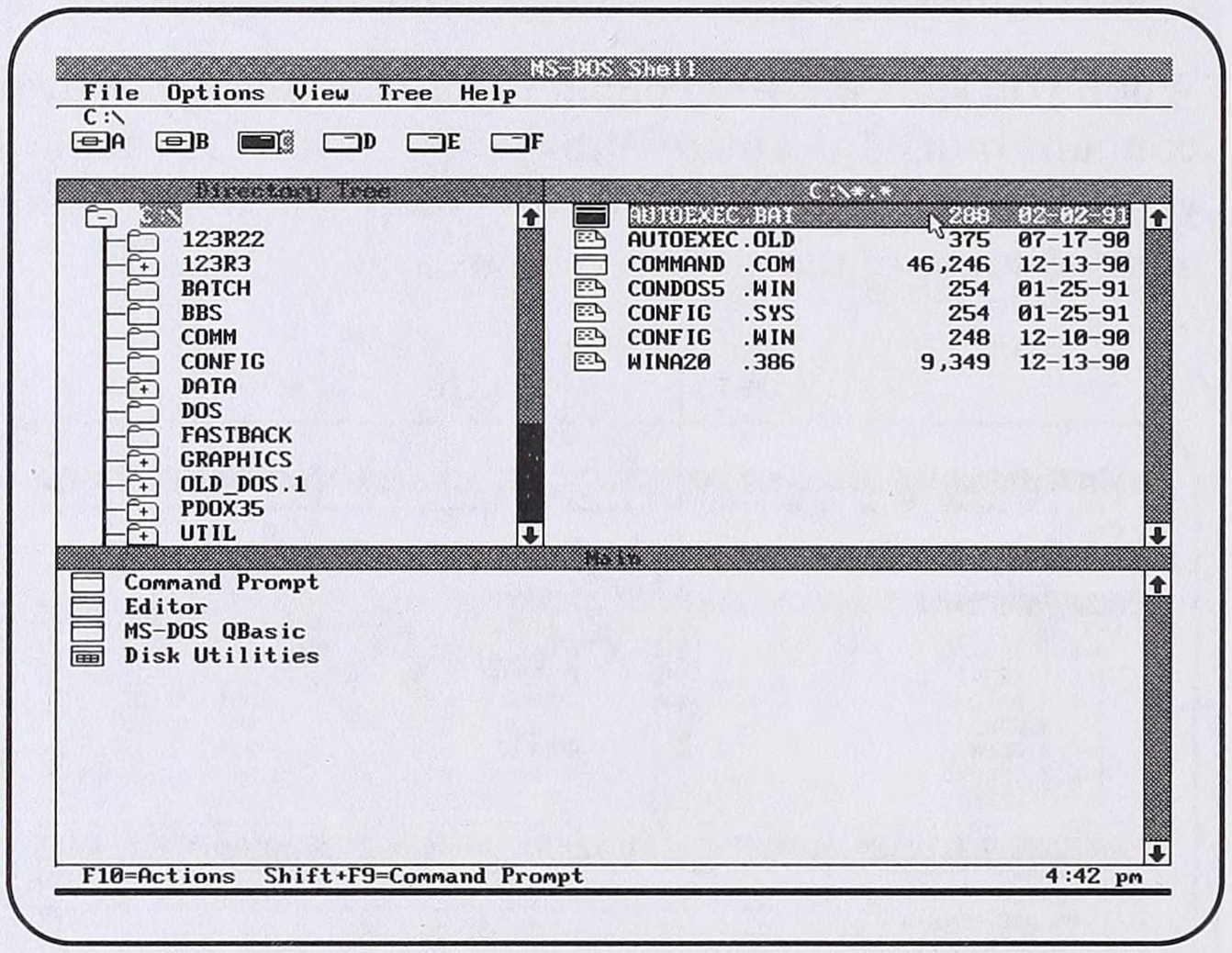


The initial Shell view can contain up to 25 lines of text. Use this display mode if your monitor can display text only or if you have a low-resolution CGA monitor. This Shell view has three *areas*: The directory tree at the left, the list of files at the right, and a list of programs at the bottom.

A number of items in the Shell display appear highlighted. The highlighted items are *selected*. One of the disk drive letters appears highlighted. This drive is the selected drive and the displayed list of directories are for the selected drive. One of the directories is highlighted. This is the selected directory and the displayed list of files are the files in the selected directory. When you use

the Shell, it is important to know which items are selected. This will become quite clear throughout this chapter.

If you have an EGA or VGA display, you can display the Shell in graphics mode. Changing the display options for this mode is discussed later in this chapter.



The Shell view in 34-line graphics mode. Use this mode if your monitor has EGA or better resolution.

In graphics mode, the Shell uses *icons*, or little pictures to represent disk drives, directories, programs, and text files. Other parts of the display, such as the scroll bars and the mouse pointer, also are easier to read in graphics mode. Table 4.1 describes the basic parts of the Shell display.

Table 4.1
The Parts of the DOS Shell

Part	*Description*
Title bar	The name of the current window or dialog box.
Menu bar	The bar below the main window title bar with the list of pull-down menu options.

Part	*Description*
Drive letters	The list of disk drives that your computer recognizes. The *selected drive* is highlighted. Drives A and B are floppy drives. The first hard disk drive is C. If your hard disk drive or drives are partitioned into separate logical drives, each drive letter is treated as a separate physical drive.
Directory Tree area title	Identifies the directory tree area. The title is highlighted when this area is selected.
Directory Tree area	This area shows the directories for the selected drive. The selected directory is highlighted.
Files area title	Identifies the files area. The title is highlighted when this area is selected.
Files area	This area shows the files for the selected directory. The selected file is highlighted.
Program area title	Identifies the program area. The title is highlighted when this area is selected.
Program area	Lists the programs available from the current *program group* and lists other program groups. Program groups are discussed in Chapter 9.
Selection cursor	A highlighted area or band that indicates the selected drive, directory, file, or program.
Status line	The bottom line of the Shell display shows some function key actions, messages, and the current time.
Mouse pointer	The current position of the mouse on the display. You use the mouse pointer to select items.
Scroll bars	Used to scroll a list of directories, files, or programs that is too long to fit in the display area.

From the Shell you can execute DOS commands, run programs, view the contents of files, and change the way that the Shell display appears. All these actions are performed by selecting menu options. You do not have to remember command names or the format and parameters of the commands. Just browse through the Shell to see what commands are available.

Selecting Items

The concept of selecting an item and then performing some action with the item is one of the main concepts behind the Shell graphical user interface. An item can be a disk, a directory, a file, or a program. You select an item by using either the mouse or the keyboard. You select an action from a menu or you use a *shortcut key*.

Using the Mouse

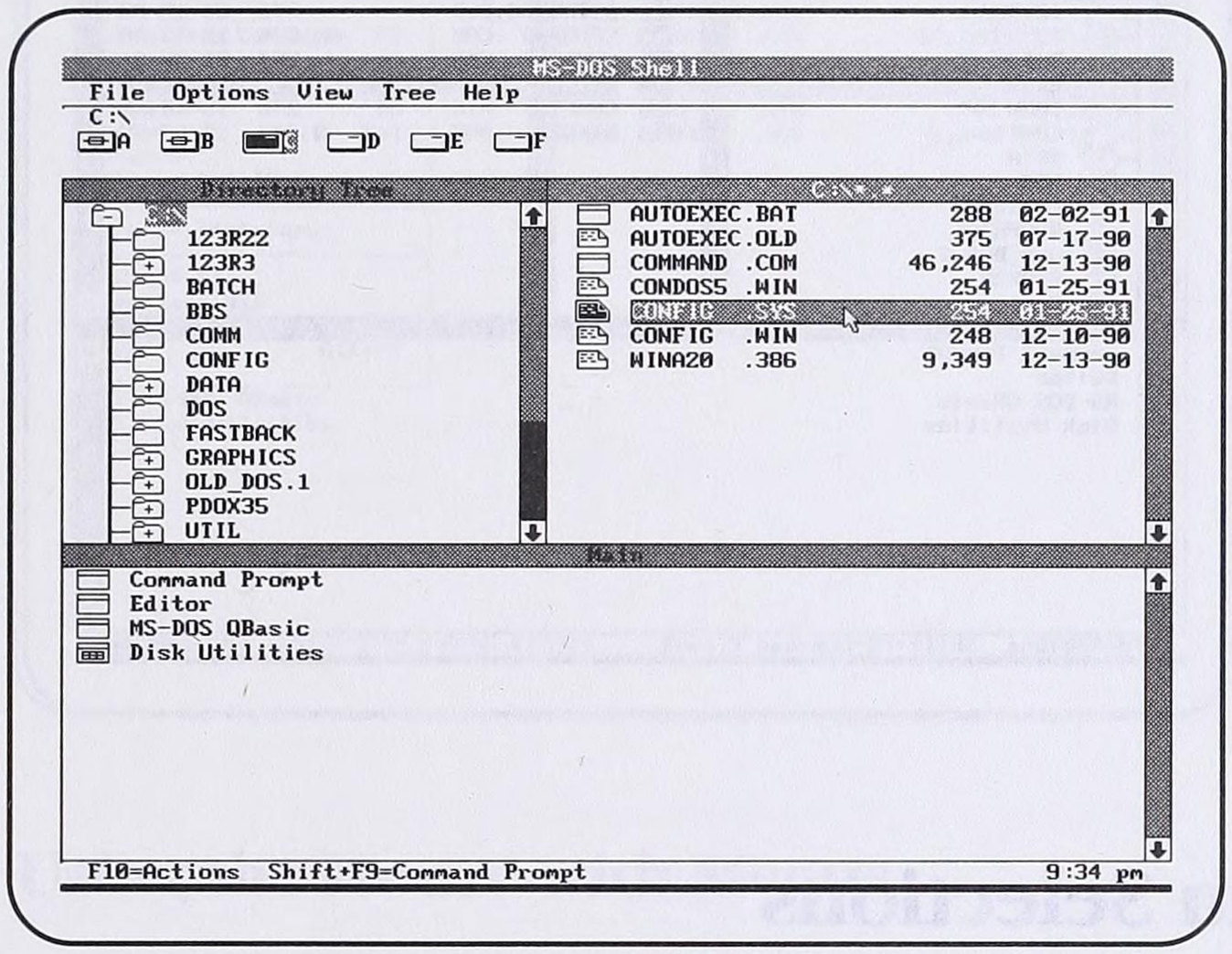
Although you can use the Shell with the keyboard or the mouse, you will find it much easier to use the mouse. The graphical user interface was designed for use with a mouse. In fact, the mouse was designed and developed specifically to control a graphical interface.

With the mouse, you can select items and menu options. As you move the mouse, the mouse pointer moves in the same direction on the screen. The mouse pointer takes on different shapes in the various modes of DOS 5. In graphics mode, for example, the mouse pointer is an arrow. In text mode, the mouse pointer is a grey rectangle. The mouse pointer changes shape to indicate the action taking place.

To select an item with the mouse, make sure that the tip of the mouse pointer is over the item you want to select and *click* the left button. Your mouse may have two or three buttons, but in most cases, you only use the left button. When you click a mouse button, you press the button down once without moving the mouse. Don't press too hard. Gentle pressure with one finger is all that is needed to click the mouse. If you press too hard, you may move the mouse as you click and make the wrong selection.

You should be familiar with mouse terminology. The expression to *click on* an item, means to move the mouse pointer until it is over the file name, then click the mouse. At times, you *double-click* the mouse, which means to click the mouse twice in rapid succession. To *drag* the mouse, move the mouse pointer over an object and then press the mouse button and hold it down as

you move the object with the mouse pointer. Unlike the keyboard cursor keys, you can move the mouse in any direction: up, down, left, right, or at any angle.



Move the mouse pointer to the item you want to select and click the left mouse button. The selection cursor highlights the item selected. In this example, CONFIG.SYS is selected.

Using the Keyboard

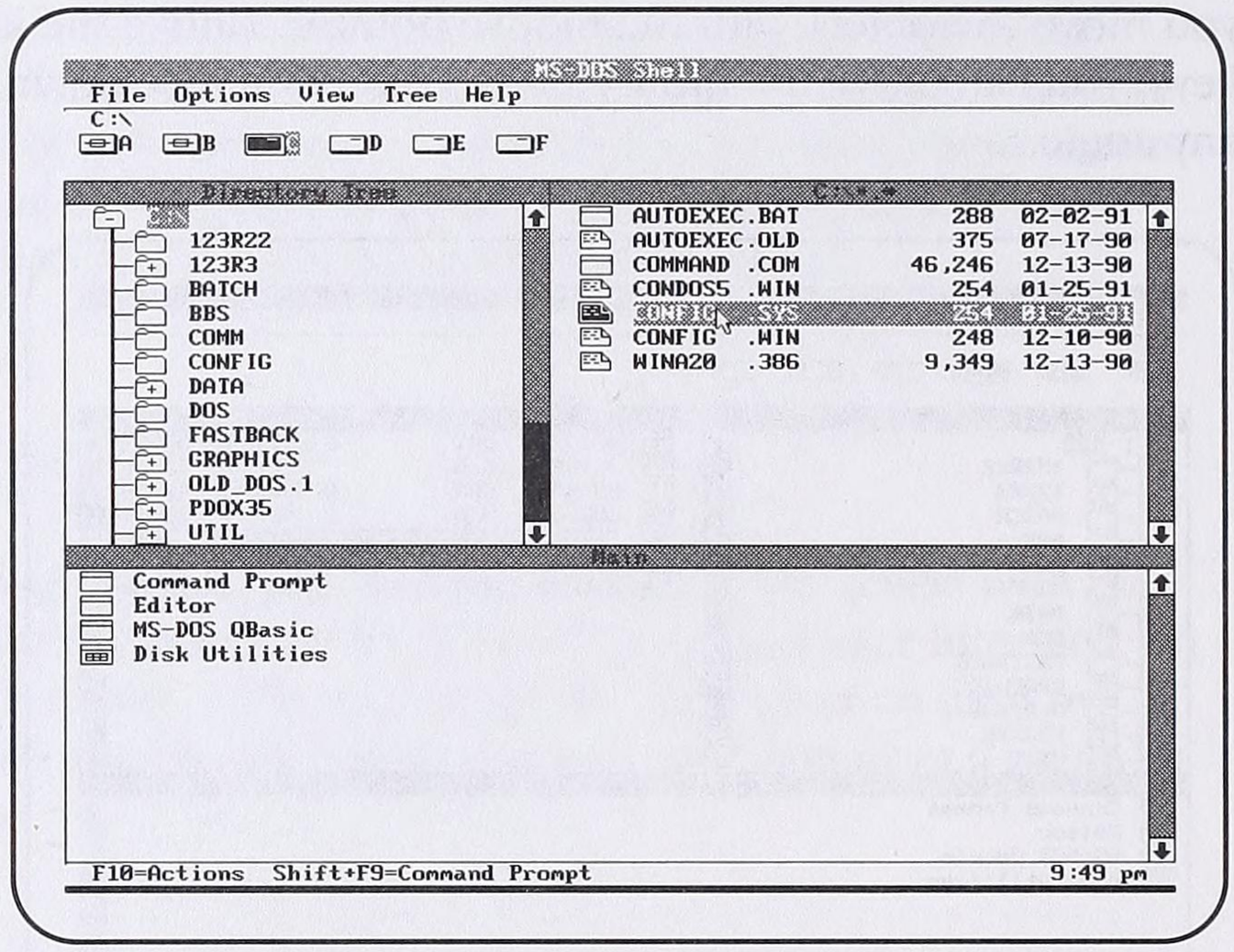
Although slower than using a mouse, the keyboard procedure works just as well. To select an item using the keyboard, follow these steps:

1. Press Tab to select the area you want.

   The selected area title bar is highlighted as you press the Tab key. If no title bars are highlighted, the selected area is the drive letters near the top of the display.

2. Press ↑ and ↓ to move the selection cursor to the directory, file, or program you want to select. In the disk drives area, press ← and → to select a different disk drive. Press ↵Enter.

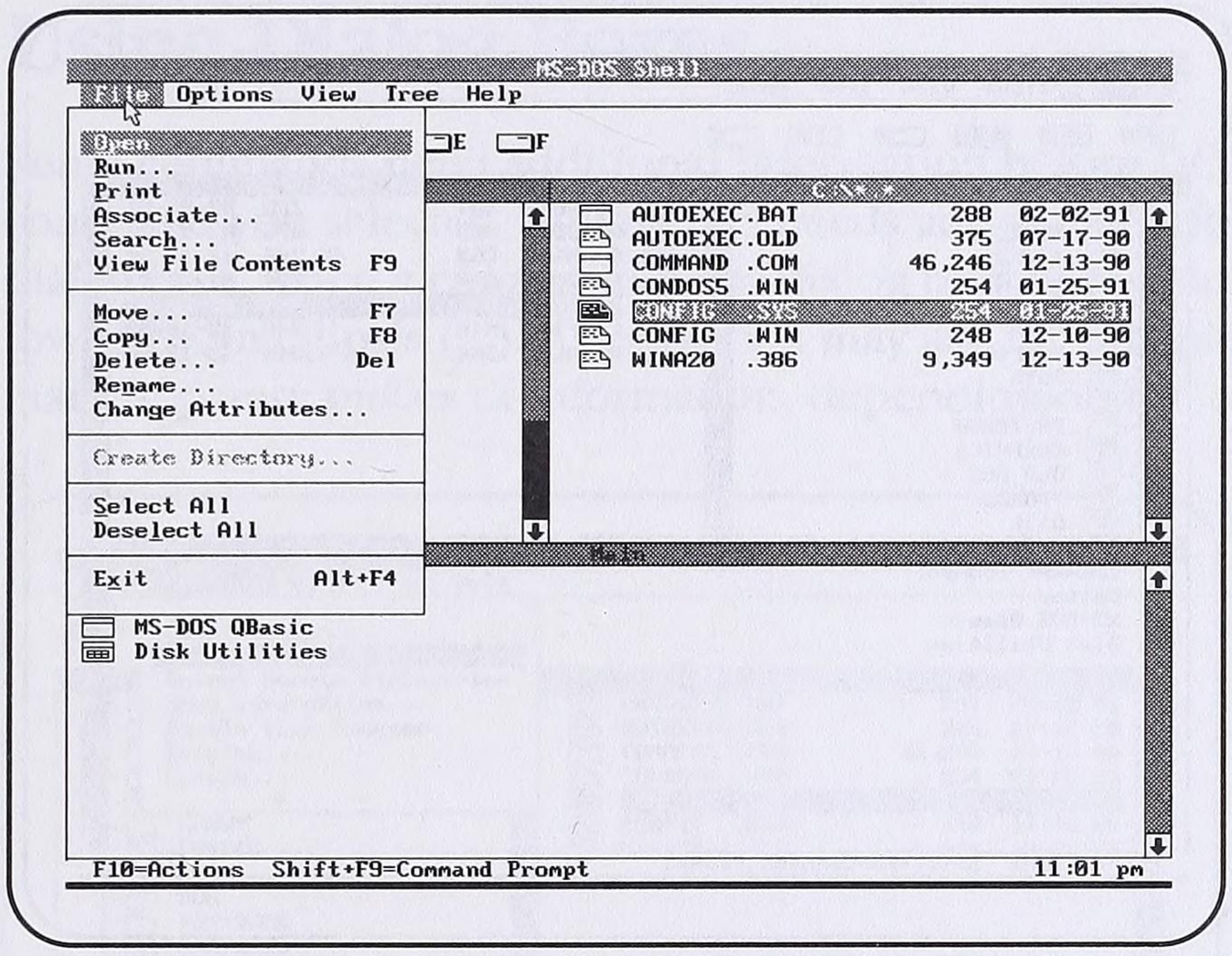
If no area is selected, the selection cursor is in the disk drives area.



Making Menu Selections

After you select an item, you choose an action. Most often you choose an action from a menu. The initial menu options are listed in the menu bar. The possible menu selections are File, Options, View, Tree, and Help.

After you select a menu option, you activate a *pop-down menu*. From the pop-down menu, you select the specific action, such as a DOS command, you want to use. Menu options that appear dimmed are unavailable for selection.



When you choose a menu option, DOS displays a pop-down menu with a list of commands.

4

Using the Mouse with Menus

Selecting a menu option and a command from the pop-down menu with a mouse is easy. Follow these steps:

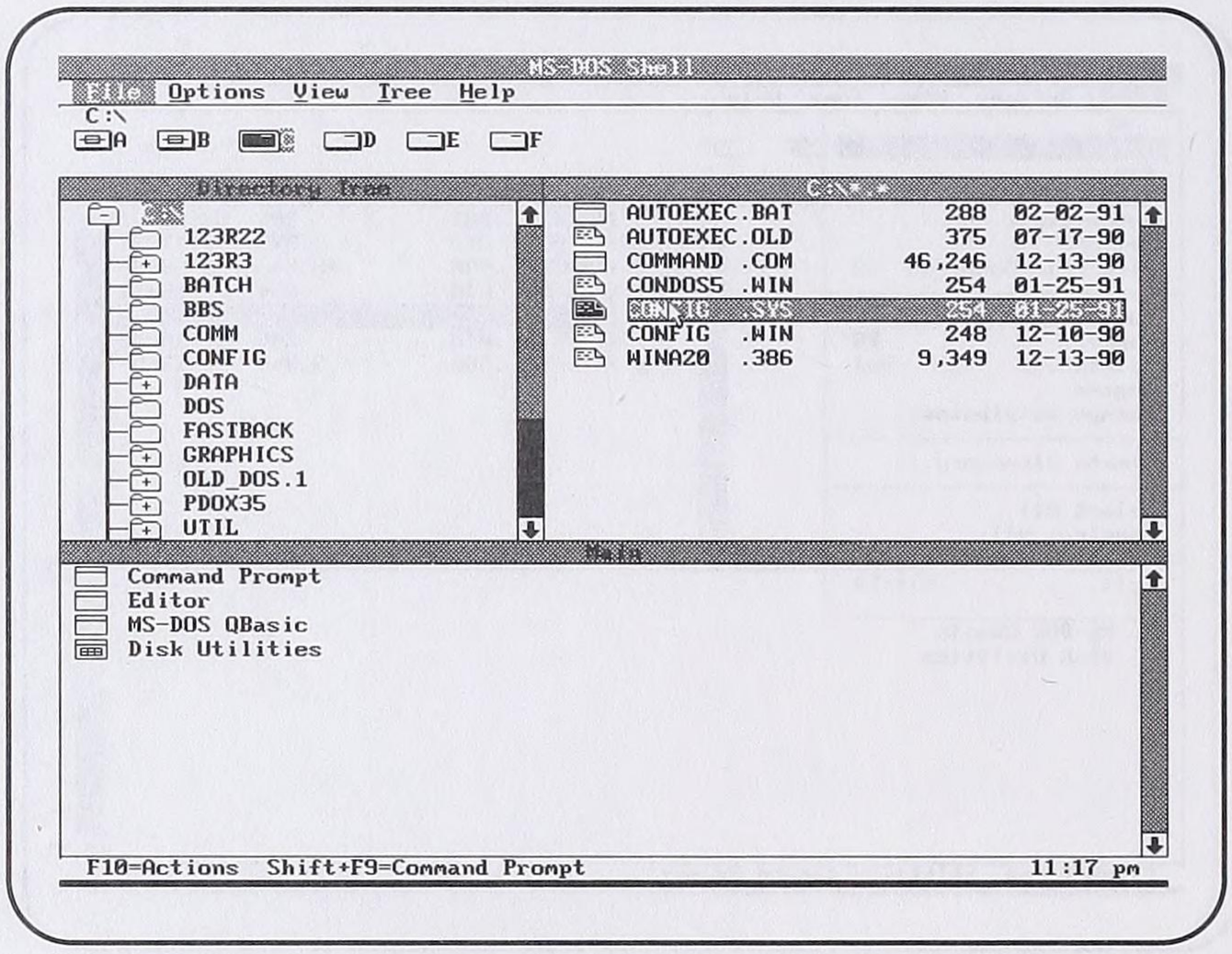
1. Move the mouse pointer to the menu option and click the mouse button.
2. Move the mouse pointer to the command you want to execute and click the mouse button again.

Using the Keyboard with Menus

To select a menu option and a command from the pop-down menu with the keyboard, follow these steps:

1. Press Alt or F10 to activate the menu bar. This action highlights the File menu option.
2. Press → or ← to highlight the menu option you want.
3. Press ↓ to activate the pop-down menu for that menu option.
4. Press ↓ and ↑ to select the command you want.
5. Press ↵Enter.

Press Alt or F10 to activate the menu bar without a mouse. You can use the arrow keys to select a menu option or type the underlined letter.



You also can use another keyboard method to make selections from a menu. This second method is faster, but may feel awkward when you are just starting out. For the quick keyboard method, follow these steps:

1. Press Alt or F10 to activate the menu bar.

   The File menu option is highlighted.
2. Type the underlined letter in the menu bar to activate the pop-down menu for that menu option.
3. Type the underlined letter in the command you want to execute.

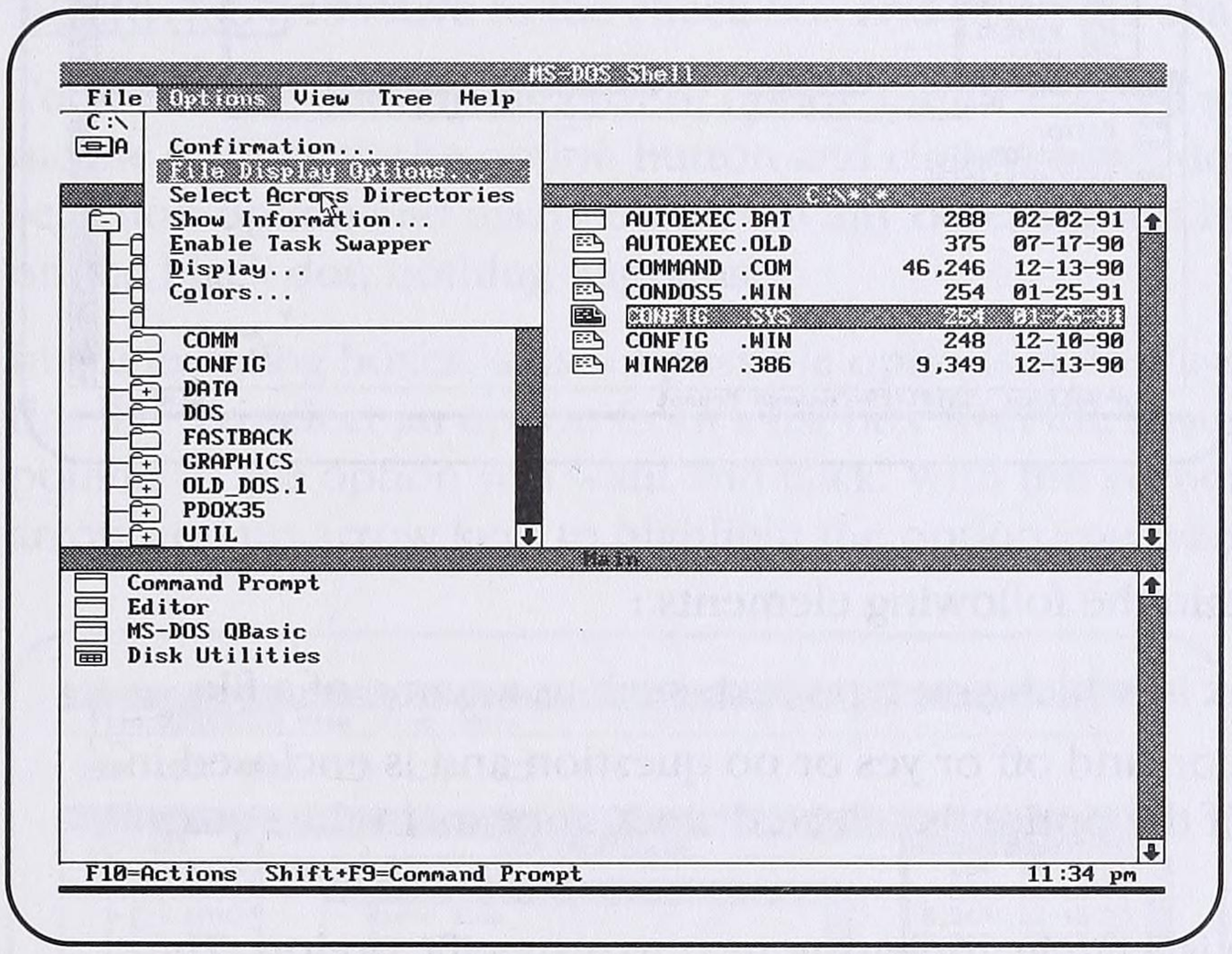
Cancelling Menus

If you select a menu in error, you can cancel the selection and make a different menu selection. To cancel a menu with the mouse, just click anywhere outside the menu area. To cancel a menu with the keyboard, press Esc.

If you make the wrong menu selection with the mouse, just click on the correct menu option in the menu bar. The original pop-down menu disappears and the new menu is displayed. If you make the wrong menu selection with the keyboard, just press ← or → to select the menu choice you want.

Using Dialog Boxes

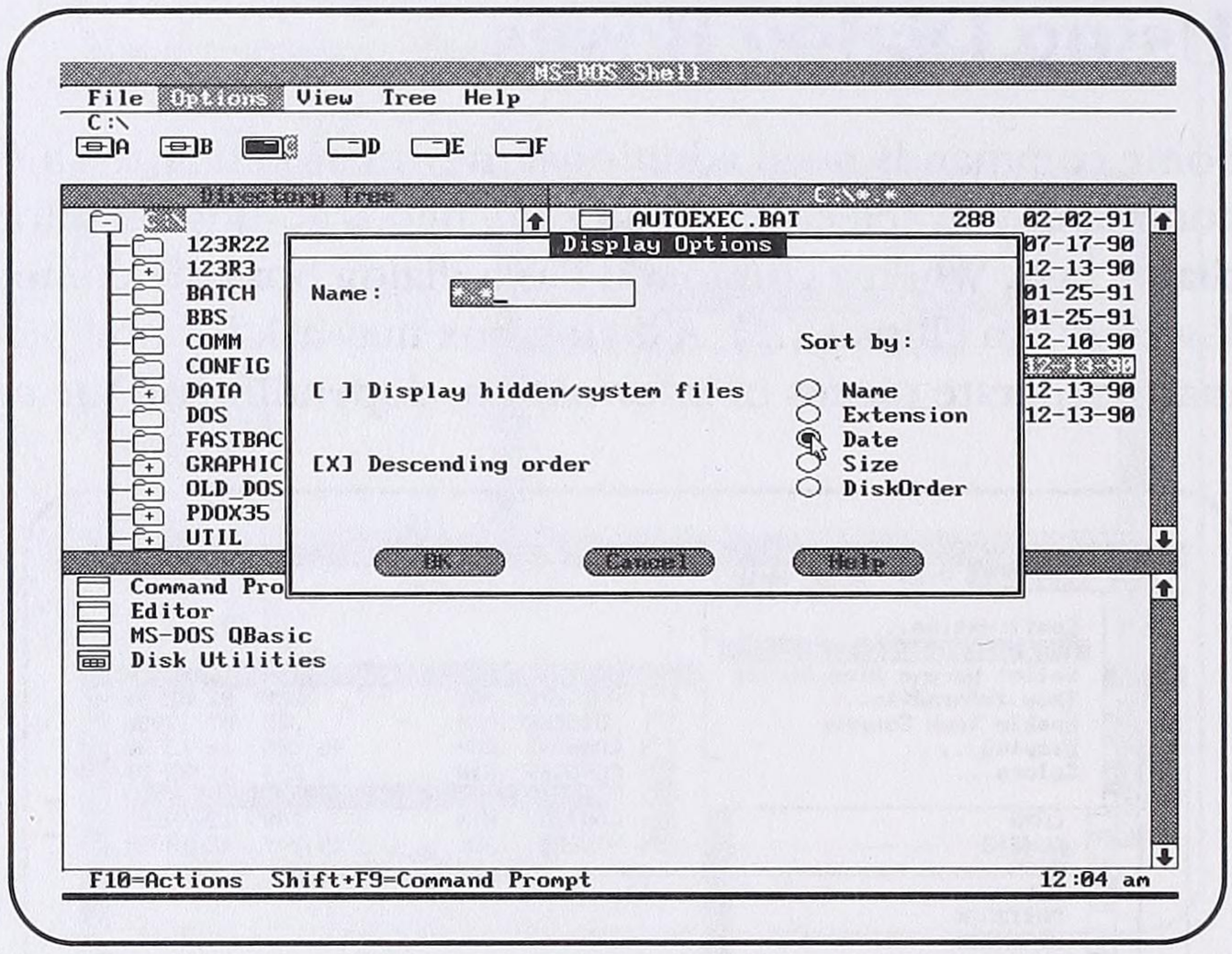
Some commands need additional information before DOS can carry out the command you selected. When DOS needs additional information, it opens a dialog box. When a command has a dialog box, the command name is followed by an ellipsis (...). A dialog box may ask for one piece of information or many separate pieces of information, depending on the command.



The File Display Options on the Options menu changes how data is displayed in the files area. You select these options in the dialog box that follows.

The dialog box is one of the most powerful features of a graphical user interface. With other menu systems, you must choose many different levels of menus to get to the one you want. Often, you must make more than 10 selections to execute one command. With pop-down menus and dialog boxes, however, you select a menu; then a command. If additional information is needed, it is requested in a dialog box that can be as large as a full screen if necessary.

The Display Options dialog box requests that you enter the files you want to see, how you want them sorted, and whether you want the hidden or system files displayed.



Dialog boxes may contain the following elements.:

- A *text box* is a box in which you type text, such as a name of a file.
- A *check box* is an on and off or yes or no question and is enclosed in square brackets. If the option is selected, an X appears in the square brackets.
- An *option button* is a circle appearing next to a specific option. The selected option has a black dot in the circle.
- A *list box* is really like a list of option buttons in a different format. You can choose one and only one option from the list.
- A *command button* represents a possible action you can take from this dialog box. OK means to process the command. Cancel means to cancel the command. Help means to display on-line help for this dialog box.

Entering Text in Dialog Boxes

To select a text box in a dialog box with the mouse, move the mouse pointer to the text box and click the left mouse button. If you are using the keyboard, press Tab or Shift-Tab to move to the text box.

To type over an existing entry, just type the new entry. To change an existing entry, press ← or → to position the cursor. Press Backspace to delete a

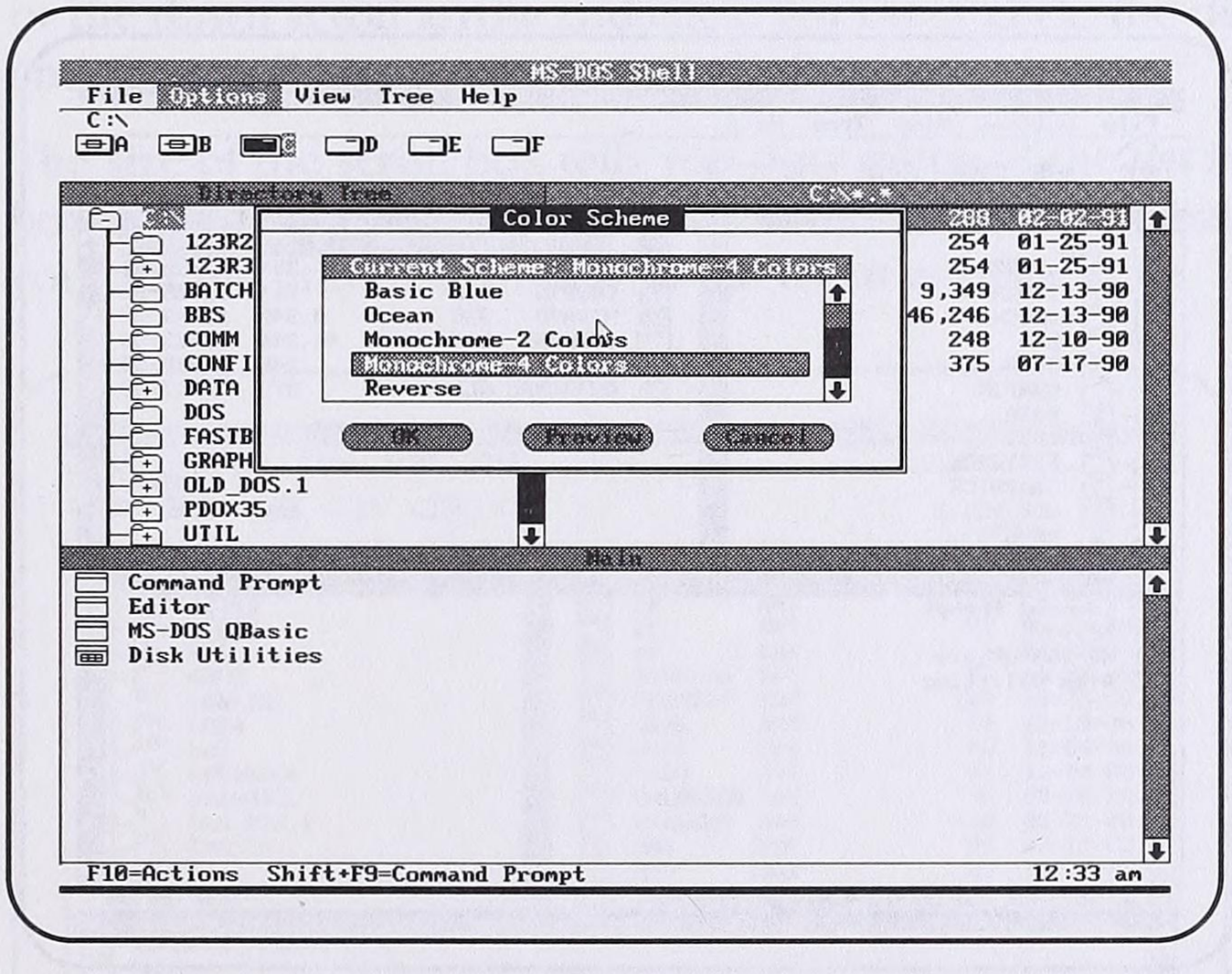
character to the left of the cursor and Del to delete the character at the cursor; then type any new text.

Selecting Options in Dialog Boxes

To select or deselect a check box with a mouse, move the mouse pointer between the square brackets and click. To use the keyboard, press Tab ↹ or ⇧Shift-Tab ↹ to move to the check box and press the space bar.

To select an option from a list of option buttons with a mouse, move the mouse pointer to the option button and click. A black dot appears in the selection option and disappears from any other button in the list. If you click on the black dot, nothing happens.

In some dialog boxes, a list of possible options is displayed. You select from this list. To select an option from a list box with the mouse, move the mouse pointer to the option you want and click. With the keyboard, use the down arrow and up arrow keys to highlight the option you want.



This list box enables you to select from a number of different color schemes, depending on the type of monitor you have.

Using Command Buttons

After you supply the requested information in a dialog box, you select the OK command button to execute the command with your choices. Select the Cancel button to ignore all information entered in the dialog box and cancel the command. Other command buttons may be available, such as Help.

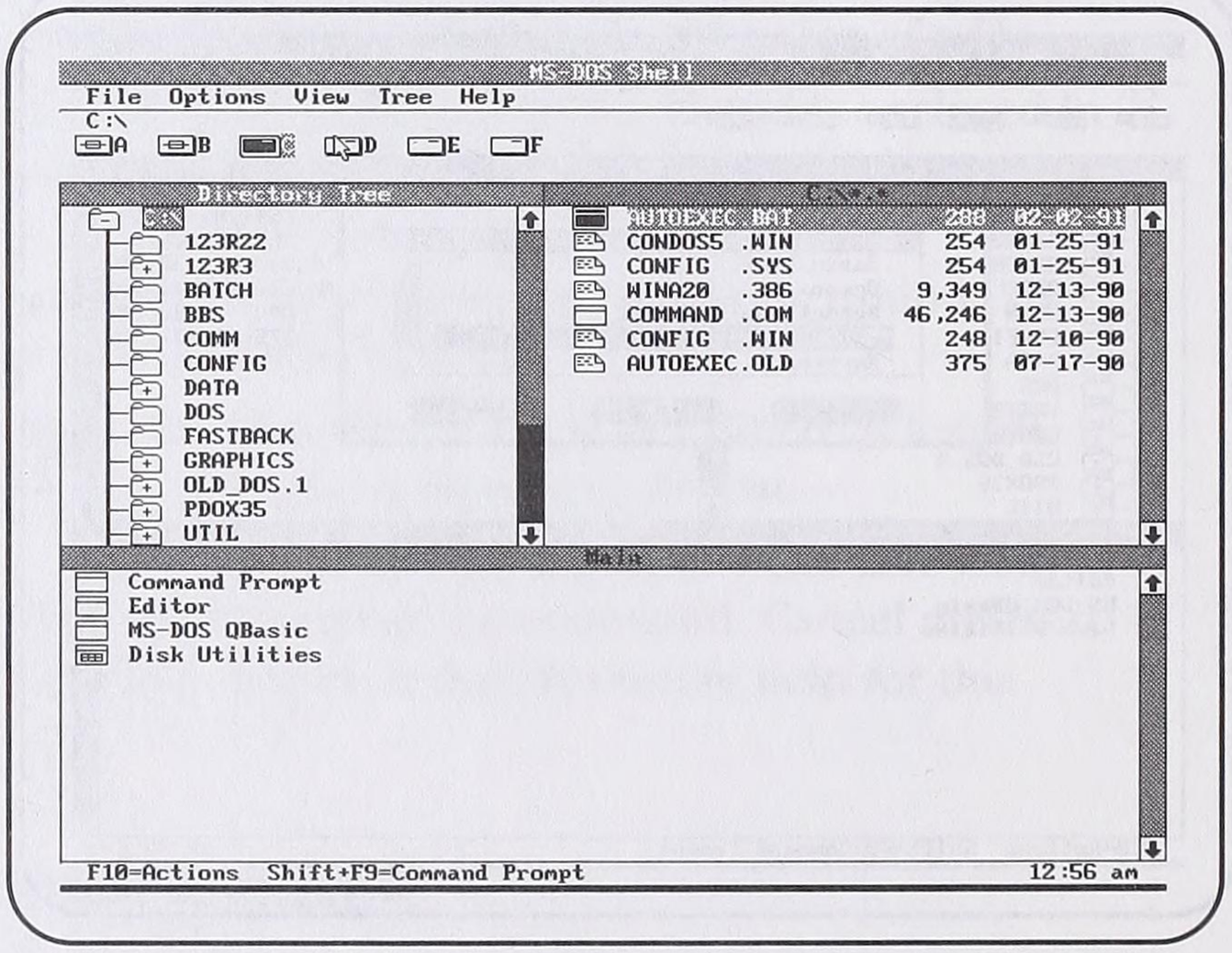
To select a command button with the mouse, move the mouse pointer to the button and click the left mouse button. If you are using the keyboard, press Tab or Shift-Tab until an underline appears in the command button you want; then press Enter or the **space bar**. You also can press Esc to cancel a command at any time.

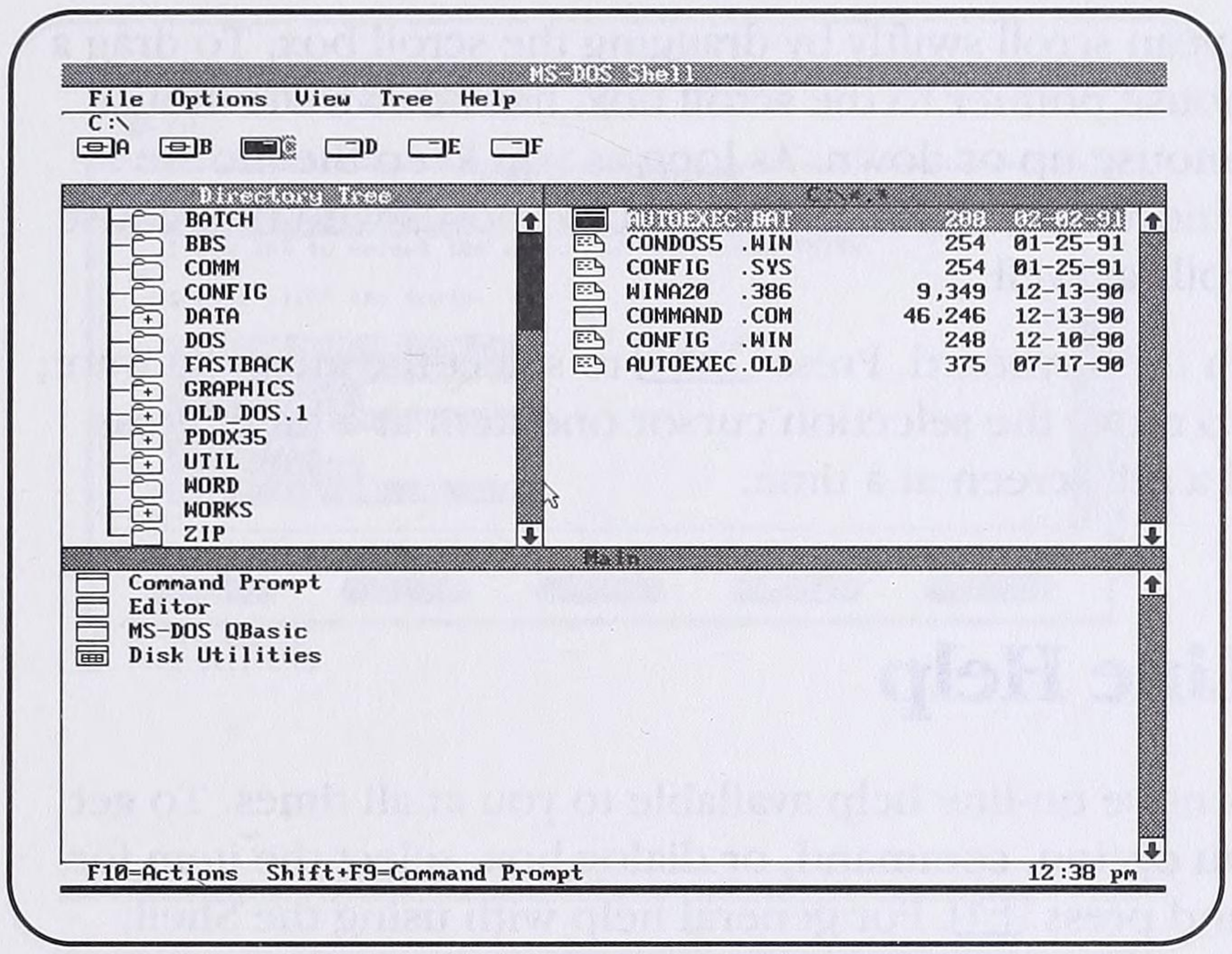
Using Scroll Bars

4

Sometimes a list is too long to fit within a display area or dialog box. If you use a mouse, you can use scroll bars to view text that is not visible. The scroll bar runs the length of a list. The scroll box is a grey rectangular box inside the scroll bar. The scroll box represents the position and the fraction of the data from the list that is currently displayed. In the Directory Tree area, the scroll box starts at the top of the scroll bar, which means that the list of directories displayed starts at the top (at the root C:\ directory). The length of the scroll box is about three-quarters the length of the scroll bar. This means that about three-quarters of the directories in the list are visible.

To scroll down a list, move the mouse pointer to the black area of the scroll bar below the scroll box. The scroll box moves down and the list scrolls down to display another part of the list.

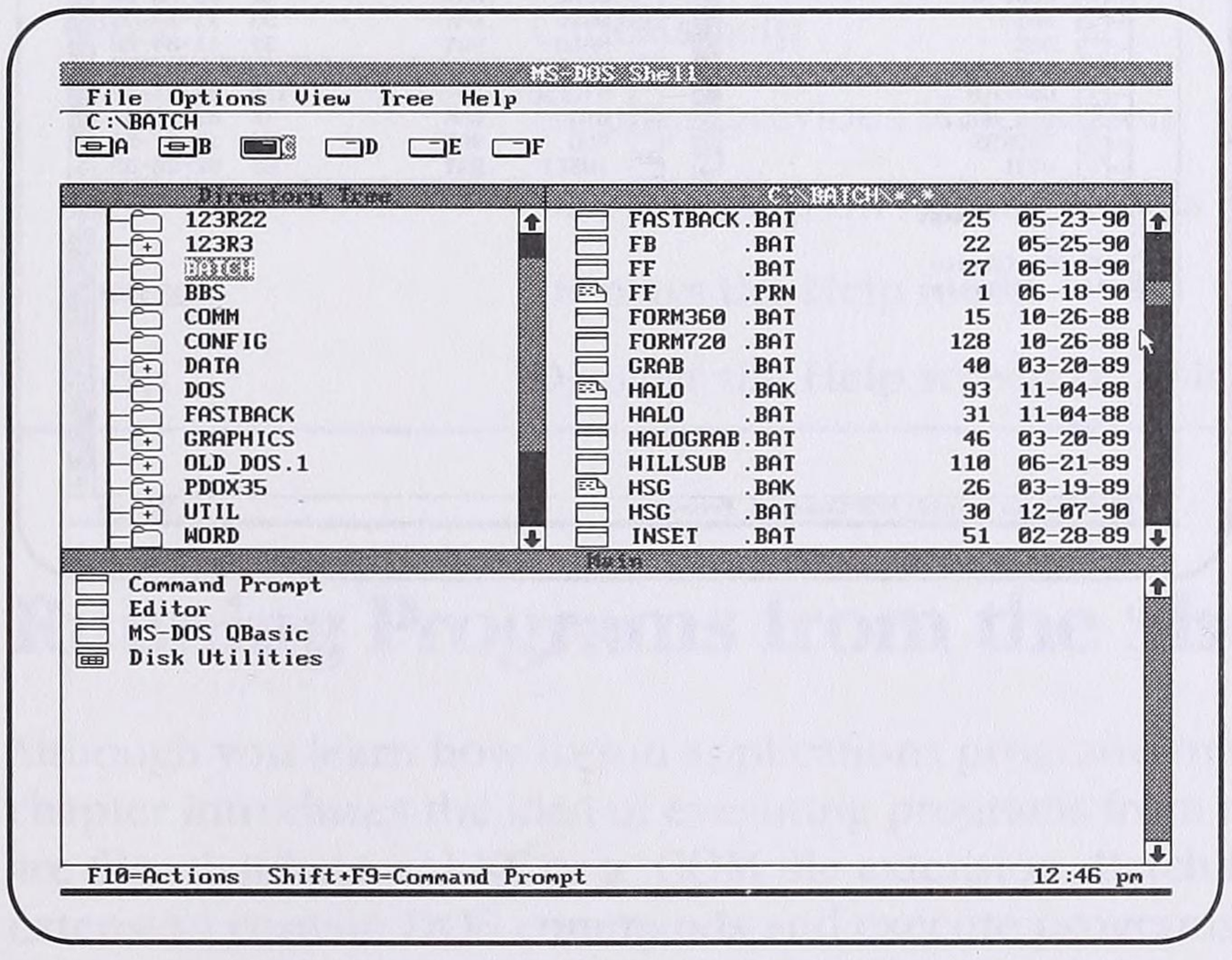




After you click below the scroll box, the display scrolls down. The bottom of the list of directories is displayed.

To scroll one line up or down, move the mouse pointer to the up scroll arrow or the down scroll arrow and click. For every click, the display scrolls one line and the scroll box moves correspondingly.

The size of the scroll box tells you how much of the list is visible. If the scroll box is small compared to the total length of the scroll bar, the list is long and you can see only a small part of the list at any one time.



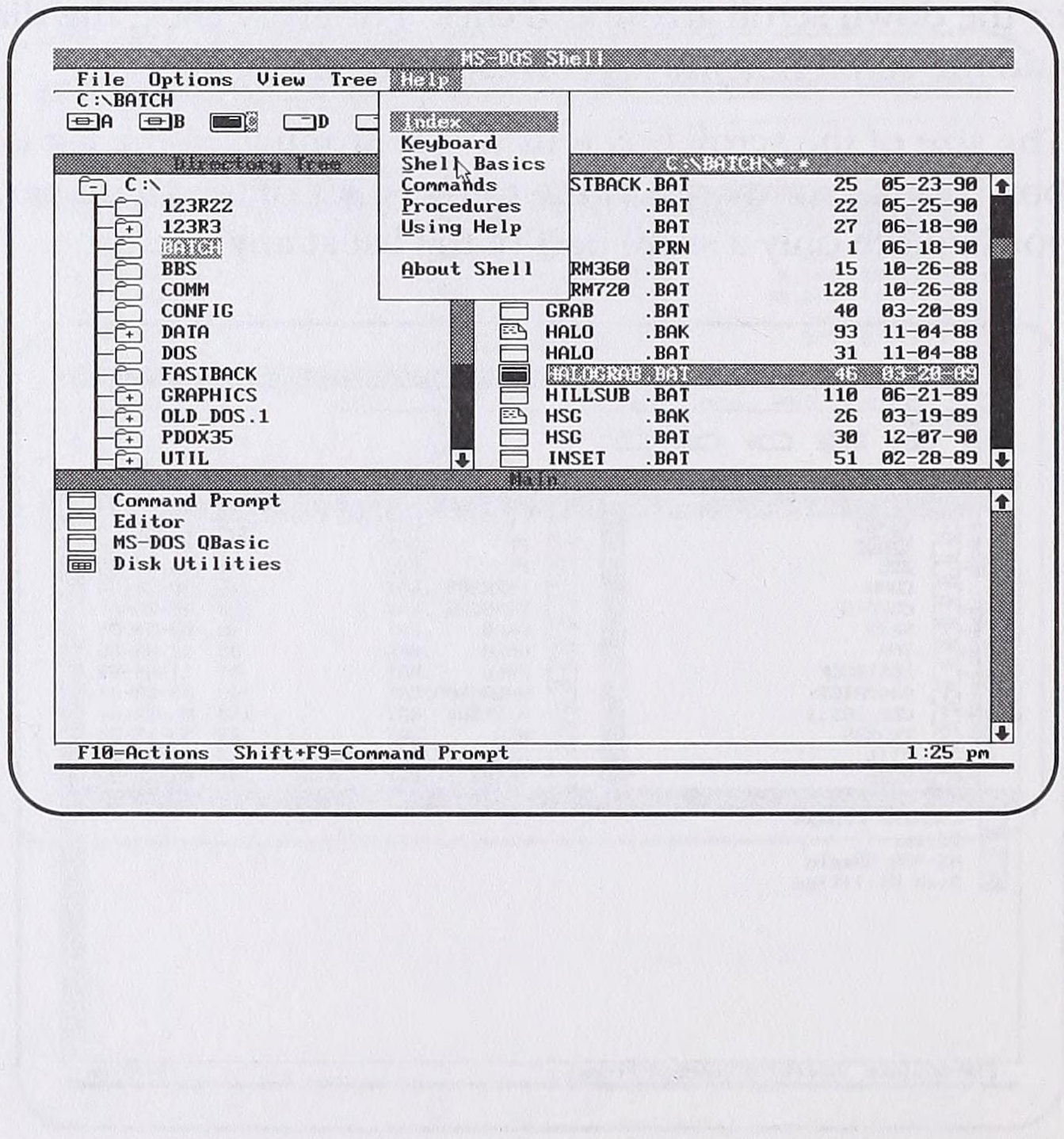
The BATCH directory contains 129 files. The scroll box indicates that only about one-tenth of the files in the list are visible.

When a list is long, you can scroll swiftly by dragging the scroll box. To drag a scroll box, move the mouse pointer to the scroll box, hold down the mouse button, and move the mouse up or down. As long as you keep the mouse button pressed as you move the mouse, the scroll box moves with the mouse pointer and the list scrolls as well.

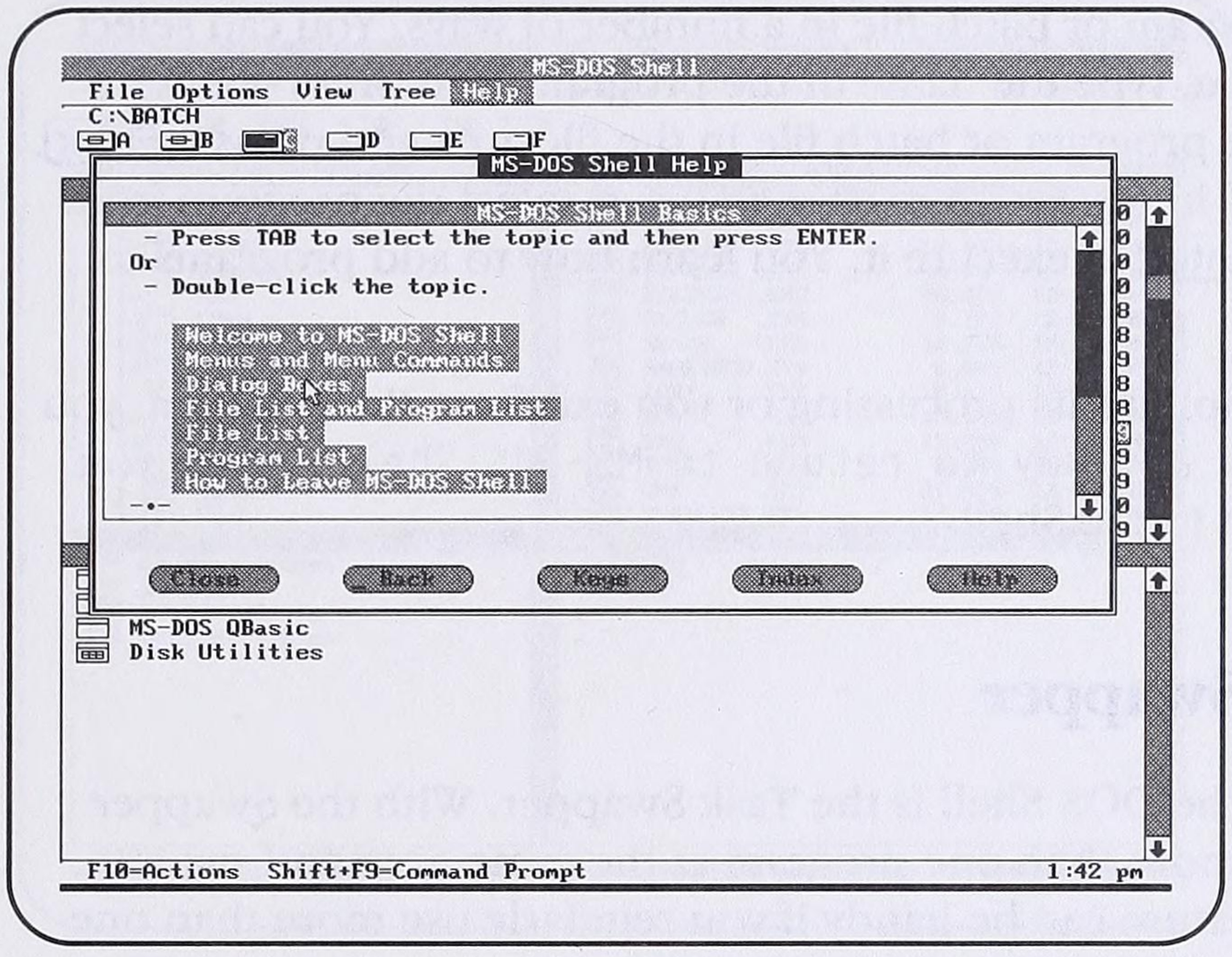
You also can scroll with the keyboard. Press Tab to select the area you want; then press ↓ and ↑ to move the selection cursor one item at a time. Press PgDn and PgUp to scroll a full screen at a time.

Getting On-Line Help

The DOS Shell has extensive on-line help available to you at all times. To get help for a specific menu option, command, or dialog box, select the item for which you want help and press F1. For general help with using the Shell, commands, procedures and the keyboard, select the Help option from the menu bar.



General on-line help is always available with the Help menu option. Select any of the Help options for additional help choices.



Additional Shell Basics Help topics are highlighted.

To get help on any of the general help topics with a mouse, double-click on a topic. If you are using the keyboard, press Tab to underline a topic, then press ↵Enter.

Each Help screen contains the following command buttons:

Command Button	*Description*
Close	Cancels help
Back	Displays previous Help screen
Keys	Displays help on keyboard keys
Index	Displays the Help index
Help	Displays the Help screen on using the Help system

Running Programs from the Shell

Although you learn how to run applications programs in Chapter 9, this chapter introduces the idea of executing programs from the Shell. Programs are files that have a .EXE or a .COM file extension. Batch files with a .BAT file extension contain DOS commands and execute programs.

You can execute a program or batch file in a number of ways. You can select **R**un from the File menu, type the name of the program, and press ↵Enter. You also can select the program or batch file in the file area and press ↵Enter. If the program is listed in the Program area, you can select the program from this area and press ↵Enter to execute it. You learn how to add programs to this area in Chapter 9.

After the program completes its processing or you exit from the program, you see the message `Press any key to return to MS-DOS Shell.` After you press a key, you return to the Shell.

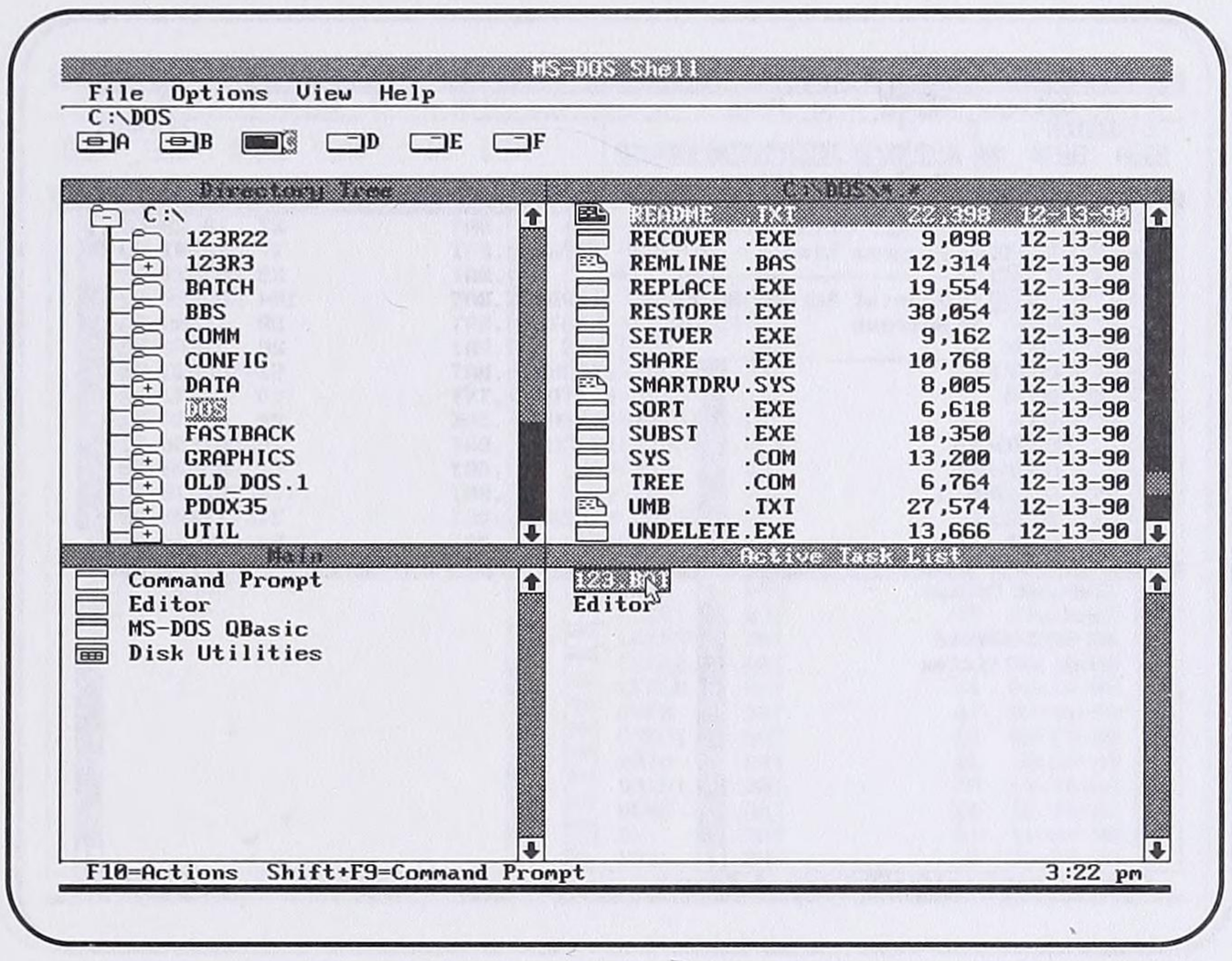
Using the Task Swapper

A powerful feature of the DOS Shell is the Task Swapper. With the Swapper enabled, you can run more than one program at the same time and swap between them. This feature can be handy if you regularly use more than one program, such as a word processor and a spreadsheet.

To enable the Task Swapper, select the Options menu, and then select **E**nable Task Swapper. A black diamond appears to the left of the command on the menu to indicate that the Swapper is enabled.

When the Task Swapper is enabled, the program area at the bottom of the screen is split into two areas. The Active Task List area lists all programs that have been started.

With the Swapper enabled, you can start a program, such as Lotus 1-2-3 or Microsoft Works, and then suspend the program and return to the Shell. To return to the Shell from a program, press Alt-Esc. Once back in the Shell, you can start one or more other programs and return to the Shell while each program is still active.



In this example, Lotus 1-2-3 was loaded using a batch file,the DOS text editor was loaded, and then action is returned to the Shell.

When you start one or more programs and return to the Shell, the programs are listed in the Active Task List area. To resume an active task, double-click the mouse or select the task and press ↵Enter.

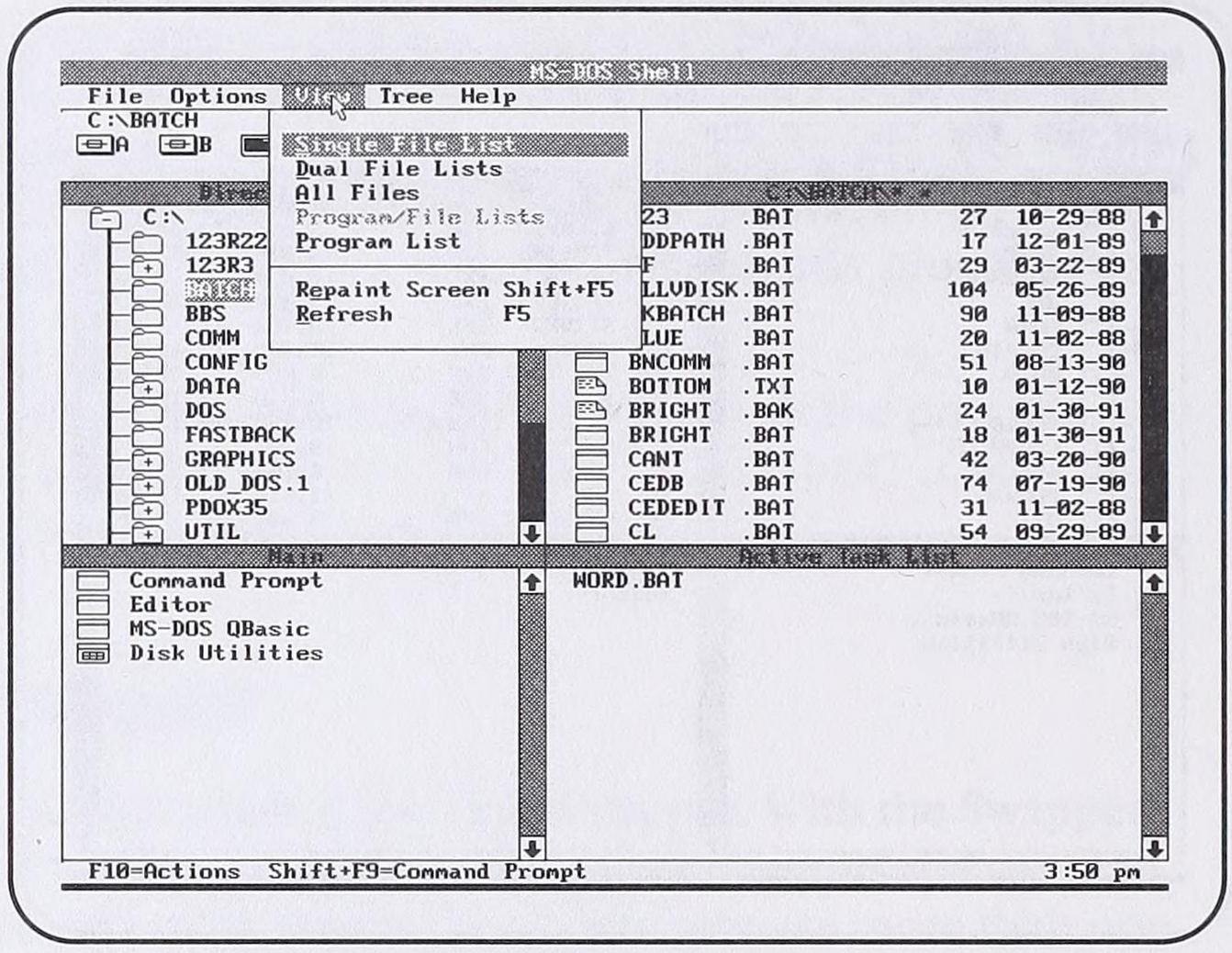
When you return to an active task, you return to the exact environment that you left. The same file or files are in memory, the cursor is in the same spot, and any options are unchanged. Because the Task Swapper is so handy, you may want to leave it enabled.

Changing the Shell Display

As you can see, a great deal of information is available to you in the Shell display. You are in control of this display. You can change the way the Shell looks in a number of ways.

Changing the Shell View

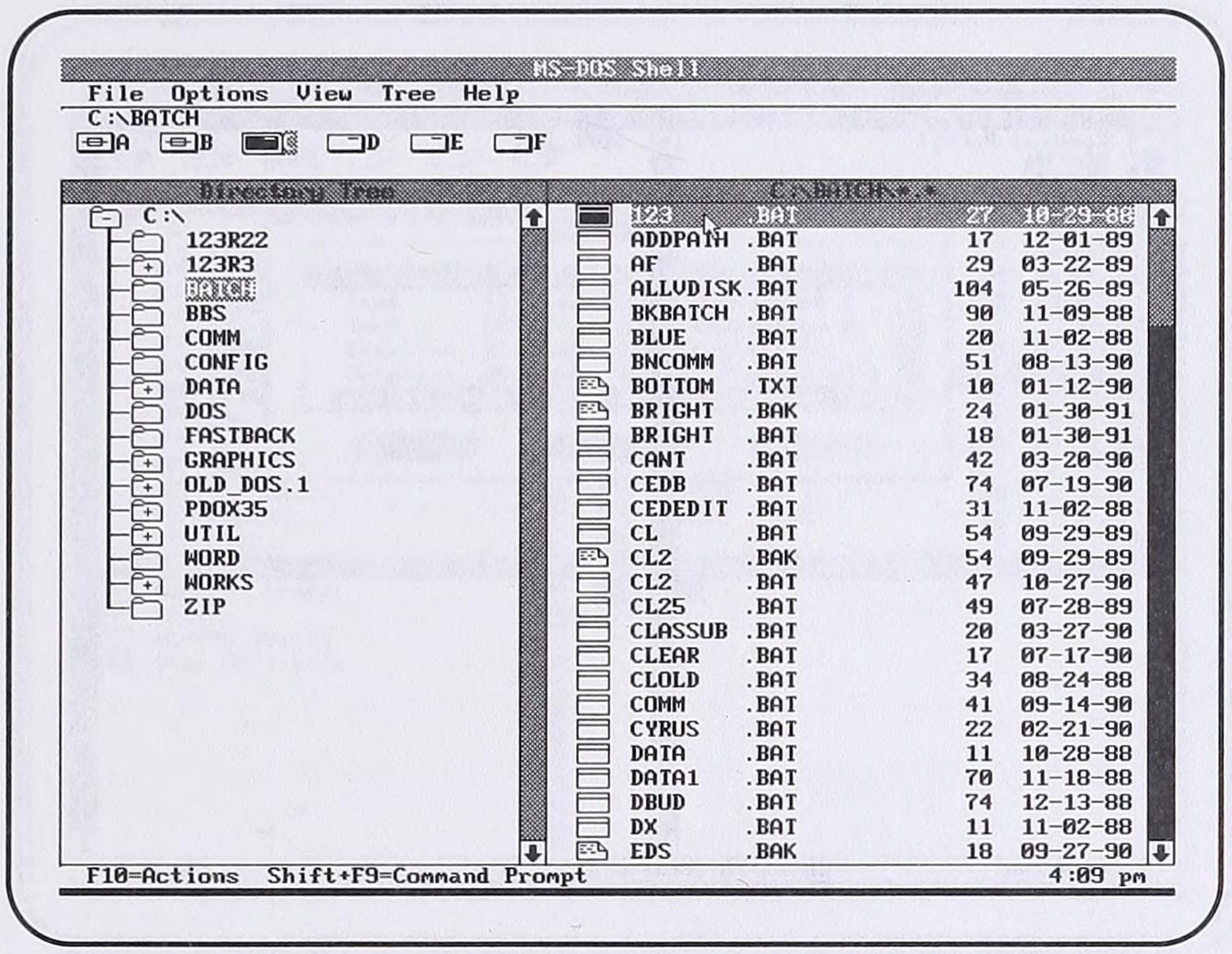
The Shell display used so far has three or four areas: a directory area, a files area, a program area, and an active task list area if the Swapper is enabled. You can change this display with the View menu options. Each display choice is called a view. Five possible view choices are available.



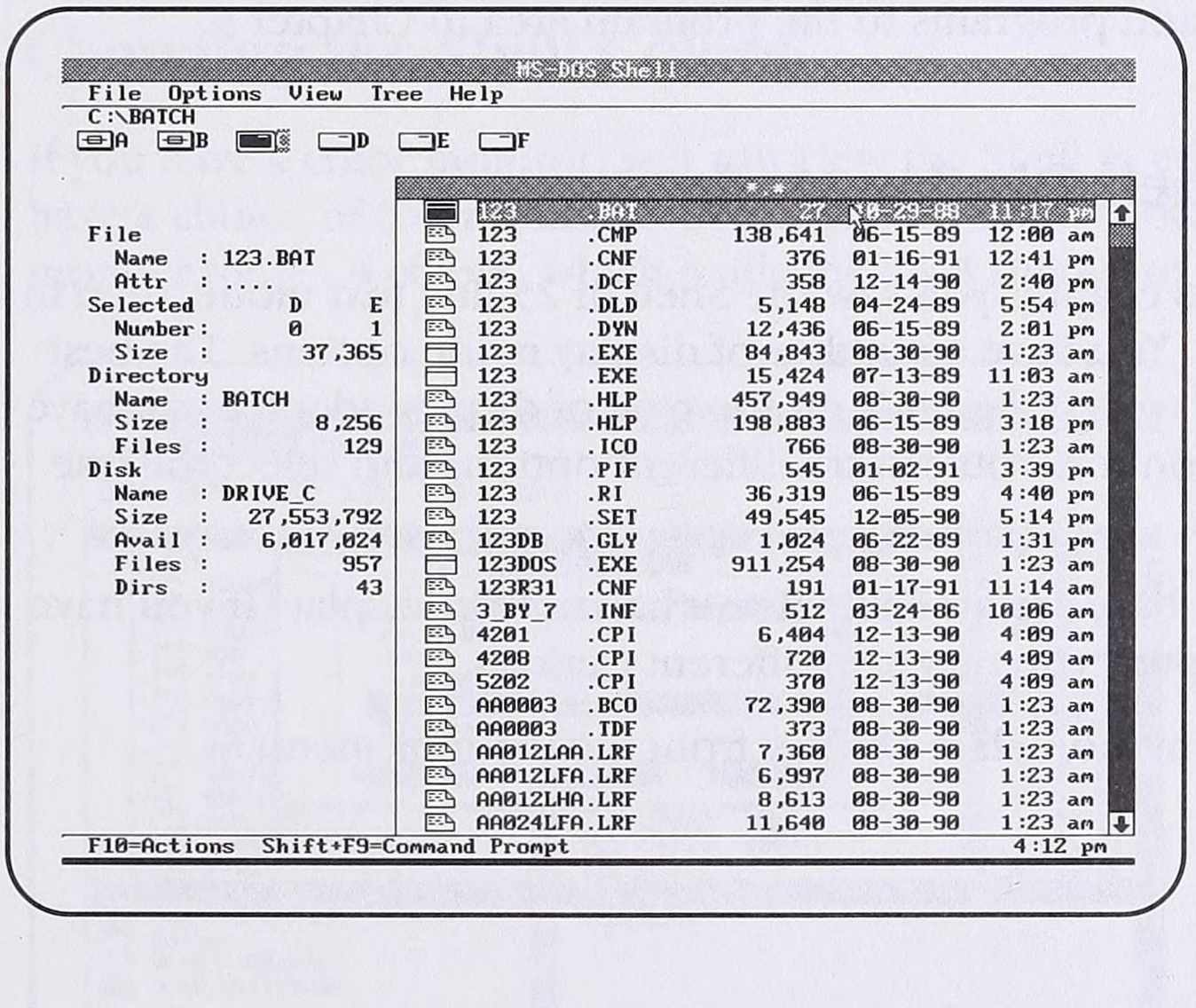
The view menu shows the possible view choices.

The default view is **P**rogram/File Lists. This view lists directories and files at the top of the screen and programs at the bottom of the screen. The current view is in grey because you cannot change the view to the current view. Program/File Lists is the most common view because it permits you to work with both files and programs at the same time.

The **D**ual File Lists view is handy when you want to copy or move files. You can display two directories on the same disk or on different disks at the same time.



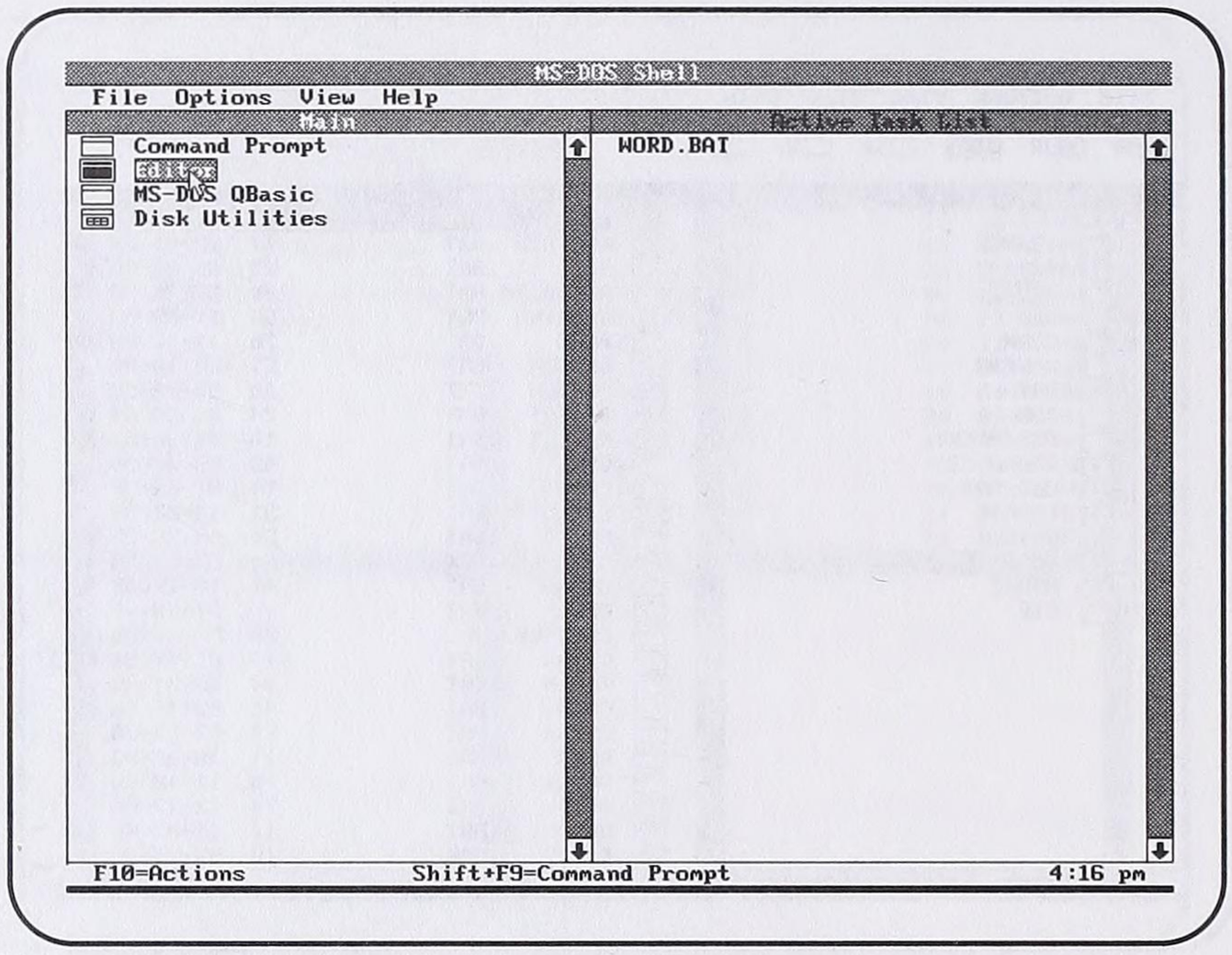
The Single File view is handy when you want to look at a large group of files. With this view, you can see the entire directory tree and many more files in the BATCH directory.



The All Files view lists every file on the disk regardless of the directory.

The All Files view is handy when you are trying to locate a specific file or looking for duplicate file names in different directories.

The Program List view is useful only if you have a long list of programs that you are using and they do not all fit in the program area with the Program/File Lists view.



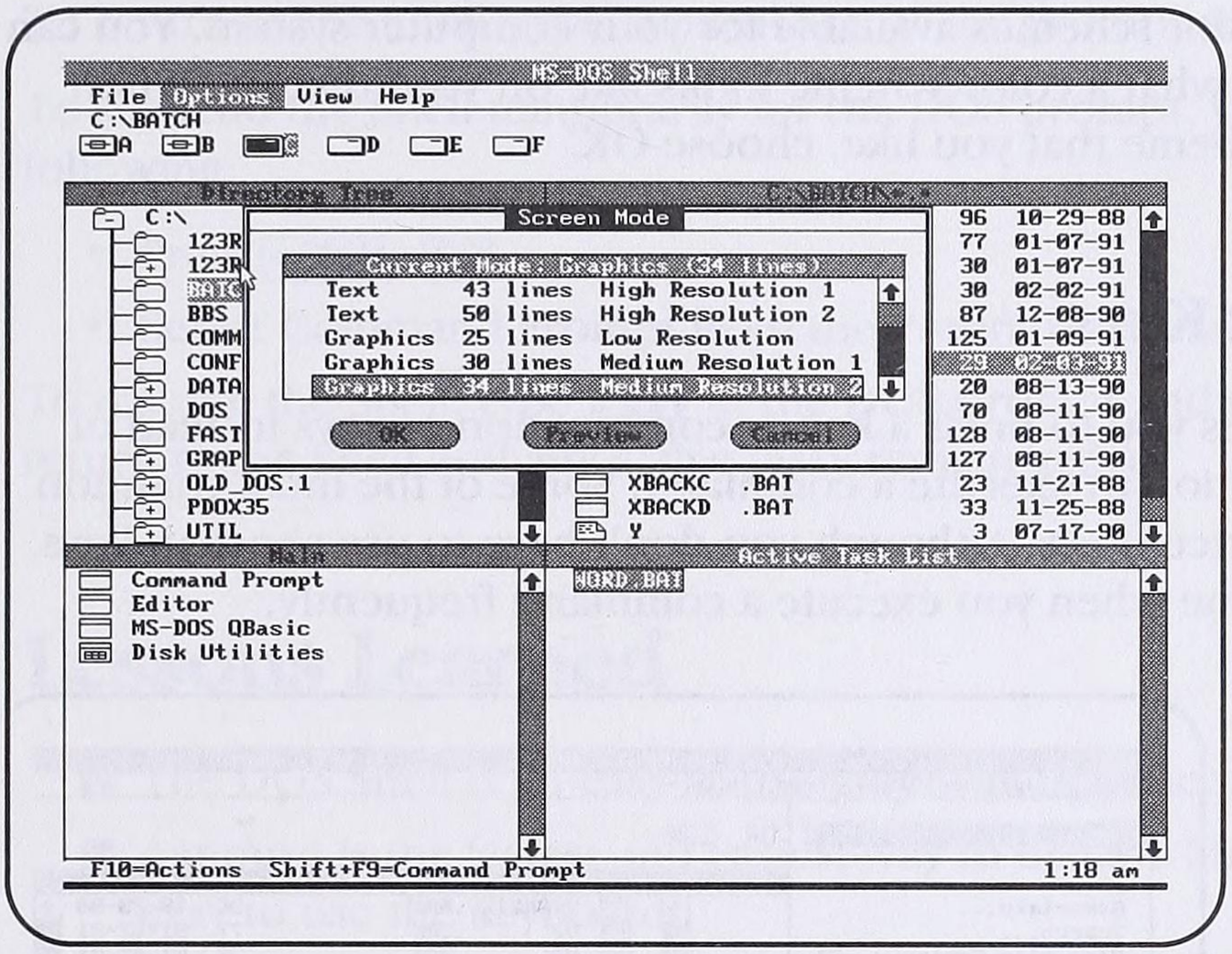
You will learn how to add programs to the program area in Chapter 9.

Changing the Shell Display Mode

At the beginning of this chapter you saw the Shell in 25-line text mode, then in 43-line graphics mode. You have a number of display mode options. The best display mode for your system depends on the type of display adapter you have and the size of your monitor. You can try different options and select the one you like best.

The options described here are available if you have a VGA display. If you have a different display adapter, you may see different options.

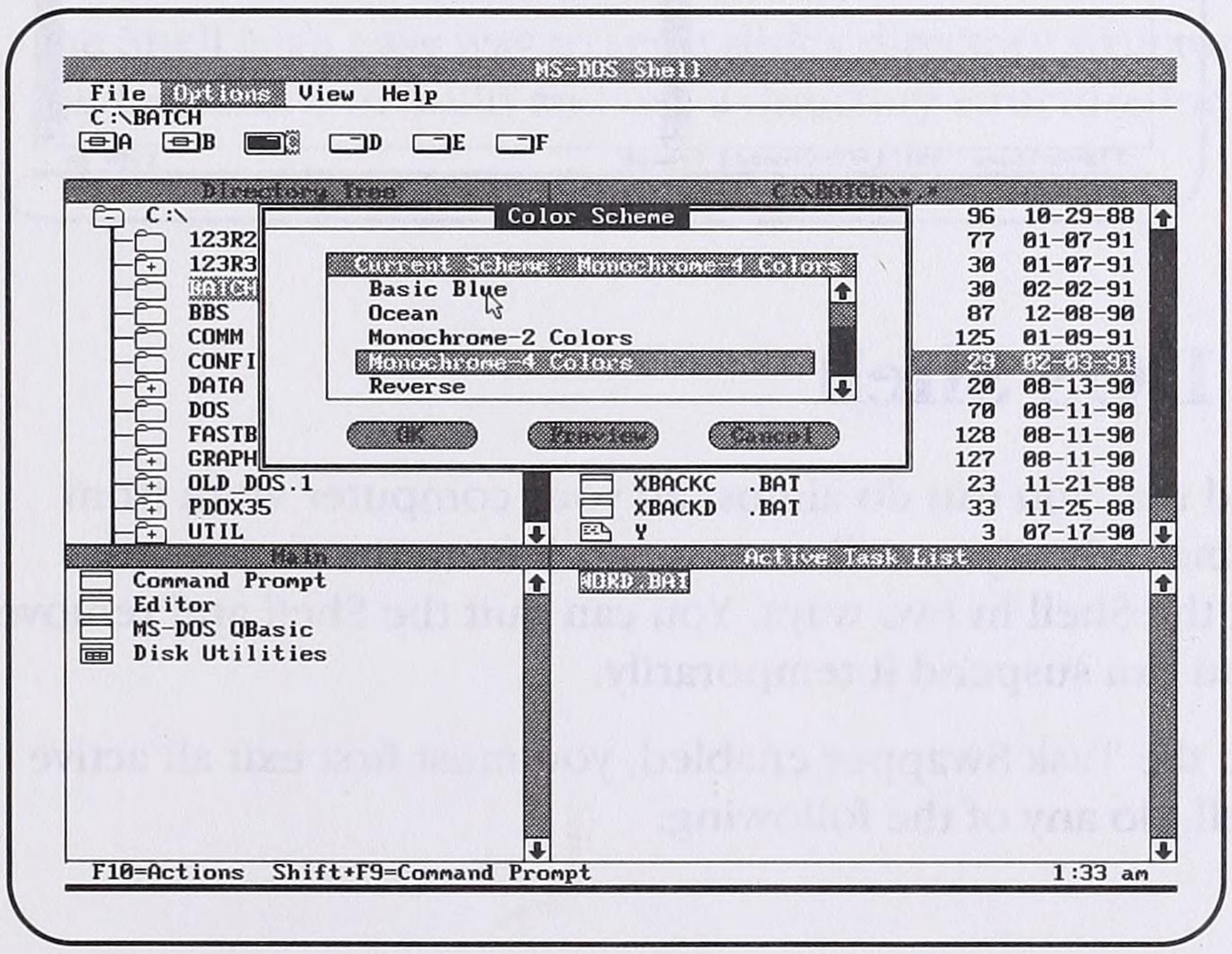
To change the display mode, select **D**isplay from the Options menu.



Scroll through the possible screen modes for your computer system. Choose Preview to see what a screen mode looks like on your display. When you find the screen mode that you like, choose OK.

Changing the Shell Colors

If you have a color monitor, you can view the Shell in color. Although you have a choice of color schemes available, this book shows the screen in monochrome - 4 colors, which really means 4 shades of gray.



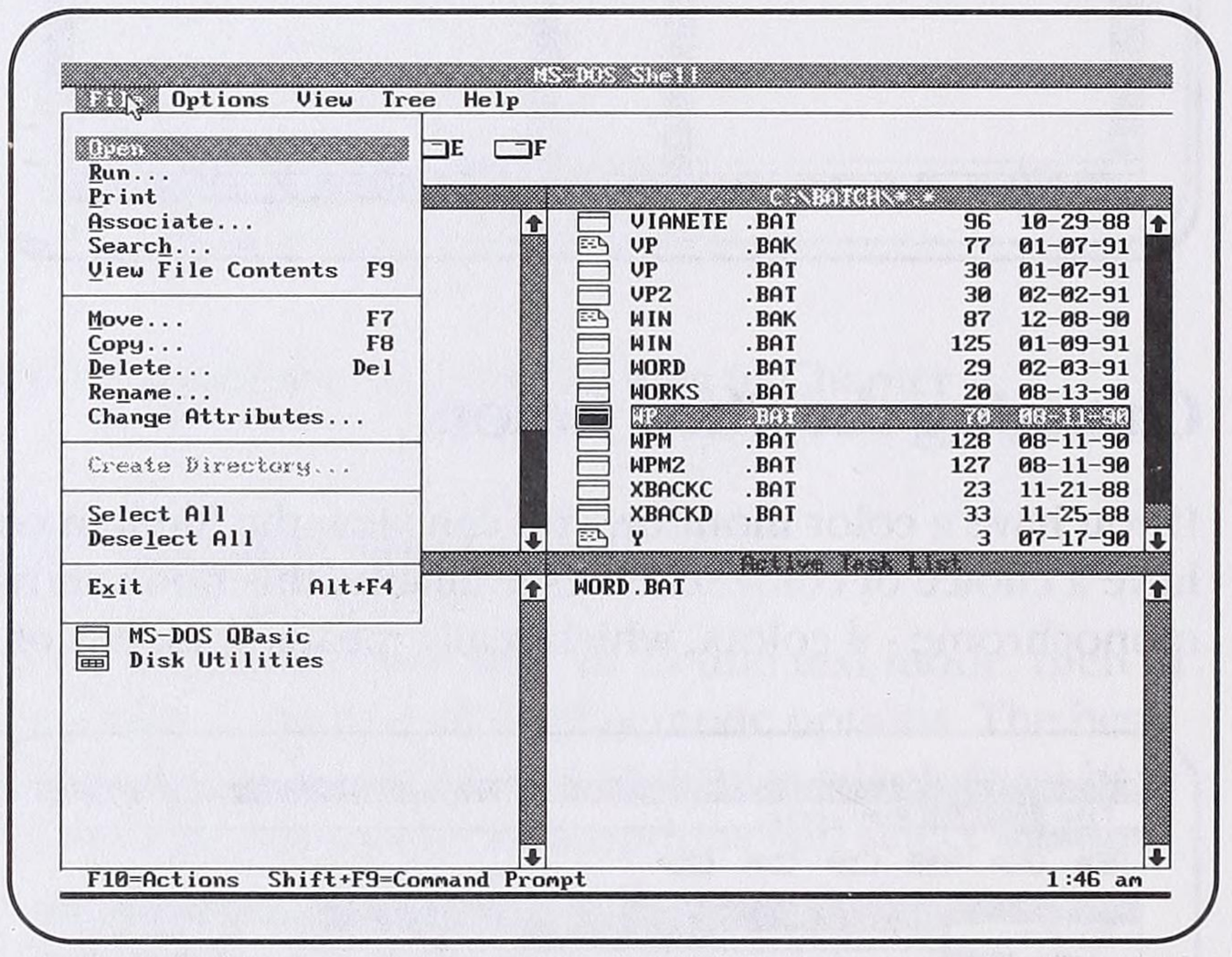
To change the color scheme, select Colors from the Options menu. The Color Scheme dialog box is displayed.

Scroll through the color schemes available for your computer system. You can select Preview to see what a color scheme looks like on your display. When you find the color scheme that you like, choose OK.

Using Shortcut Keys

A shortcut key enables you to press a key or combination of keys instead of making a menu selection to execute a command. Some of the most common commands have shortcut keys. Although you don't have to use shortcut keys, these keys do save time when you execute a command frequently.

Shortcut keys are listed after the command name in the pop-down menus. If no key is listed, that command has no shortcut key. If two keys are listed together, press both keys at the same time.



Leaving the DOS Shell

Although you will find that you can do almost all your computer work from the Shell, there are times when you will want to work from the command prompt. You can exit the Shell in two ways. You can quit the Shell and remove it from memory or you can suspend it temporarily.

To quit the Shell with the Task Swapper enabled, you must first exit all active tasks. To quit the Shell, do any of the following:

- Press F3.
- Press Alt-F4.
- Choose Exit from the File menu.

To return to the Shell, type **DOSSHELL** at the prompt and press ↵Enter.

To suspend the Shell temporarily for the DOS prompt, you can do any of the following:

- Press ⇧Shift-F9.
- Select Command Prompt from the Program area and press ↵Enter.

To resume the Shell, type **EXIT** at the DOS prompt and press ↵Enter. You return to the Shell and any active tasks remain active.

Lessons Learned

- The DOS Shell is an easy-to-use graphical interface.
- A mouse is the fastest and easiest way to use the Shell, but it is also easy to use the keyboard.
- You can use the Shell to perform many DOS commands and execute programs without knowing the names of commands.
- To use the Shell, first you select an item, then you select an action. An item can be a disk, a directory, a file, or a program.
- You select items from lists and actions from menus. You don't have to memorize names of items or actions.
- On-line help is always just a keystroke away.

The Shell is an easy way to see a disk's directory structure. In the next chapter, you learn how to build and use a directory structure for your disks.

4

5

Understanding and Using Directories

Understanding the DOS directory concept

Navigating a hard disk's directories

Finding paths in the tree structure

Exploring sample subdirectories

Viewing directory structures and file lists

Have you ever noticed how some people never get lost, and others spend half their lives stopping at gas stations to ask for directions? Some people have the enviable talent of finding their way around, almost as though the genes of a bloodhound were hiding somewhere in the obscurity of their ancestry.

Most of us lack the built-in compass, sharp vision, or sensitive sense of smell of those lucky few. You have long known that maps make trips more pleasurable. True, it is annoying to refold a map at rest areas, but it's better than pulling into service stations when you don't need fuel. Nobody likes being in a strange land and at the mercy of a stranger's instructions.

Before the oil crisis of the 1970s, you could stop at any service station and pick up a free map. In fact, one oil company even provided travel routes. All you did was write to a special address and tell the oil company where you planned to go. Within a few weeks, a map arrived showing both the quickest and the most scenic routes. DOS's directory structure provides something resembling that kind of personal touch.

Key Terms Used in This Chapter

Hierarchical directory	An organizational structure used by DOS to segregate files into levels of subdirectories.
Tree structure	A term applied to hierarchical directories to describe the concept in which directories "belong" to higher directories and "own" lower directories. Viewed graphically, the ownership relationships resemble an inverted tree.
Directory	An area of the DOS file system that holds information about files and directories. The root directory is the highest directory of DOS's tree structure. All DOS disks have a root directory, which is created automatically by DOS (Versions 2.0 and later).
Subdirectory	A directory that is created within another directory and subordinate to that directory. Also called, simply, a *directory*.
Directory specifier	A DOS command parameter that tells DOS where to find a file or where to carry out a command.
Path name	Another name for the directory specifier. The path name gives DOS the necessary directions to trace the directory tree to the directory that contains the desired commands or files.
Backslash (\)	The character that DOS expects to see in a command to separate directory names. Used alone as a parameter, the backslash signifies the root directory.

5

The DOS Directory Concept

Despite what you hear, DOS doesn't strand you on the road without a map. Understandably, people beginning to use a PC don't know the "proper address" to write for the scenic or direct routes. This chapter is designed to be your map to DOS.

In Chapters 3 and 4, you saw file lists of the contents of a disk directory. A directory is more than a file list displayed on-screen. It also is part of an internal software listing that DOS stores in a magnetic index on the disk. A poorly structured disk directory turns any hard drive into a bewildering tangle of misplaced files.

This chapter explains DOS's hierarchical, directory structure. Here, you discover how to use DOS to group and organize files. You also will learn how DOS commands help you to organize your disk directories logically.

Navigating a Hard Disk's Directories

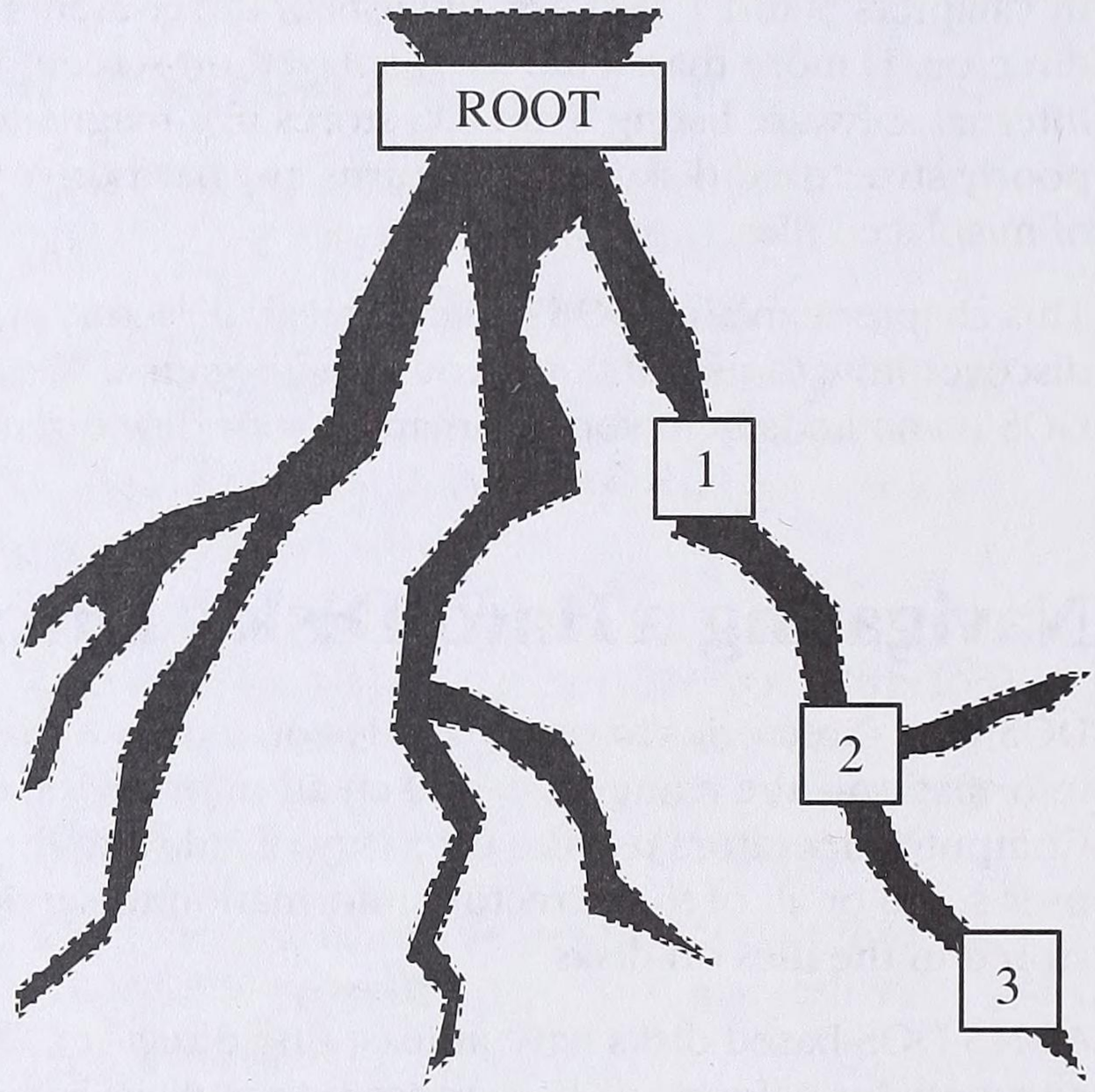
DOS uses directories to organize files on a disk. A directory listing contains file information—the name, size, and creation or revision date for each file. Computer operators use the directory of a disk to find specific files. DOS also uses some or all of this directory information to service requests for data stored in the files on disks.

All MS-DOS-based disks have at least one directory. One directory usually is adequate for a floppy disk. Because floppy disks have relatively limited capacities, the number of files that fit on a floppy is limited. Hard disks, on the other hand, have very large storage capacities. A fixed disk can contain hundreds or even thousands of files. Without some form of organization, you will waste time sifting and sorting through your disk's directories to find a specific file.

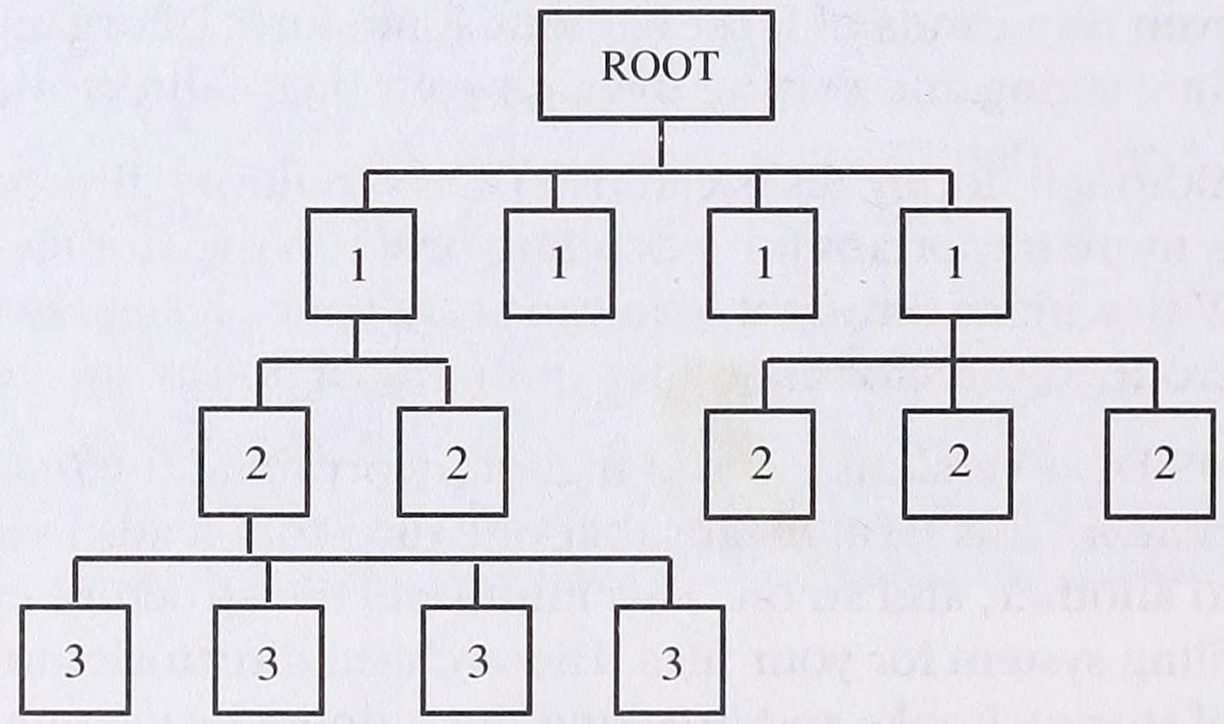
Although floppy disks can use DOS's multiple directory structure, this feature is more important for extending order to the storage capacity of hard disks. With a bit of foresight, you can store your files in fewer, more logically grouped directories so that you (and DOS) can locate your files more easily.

MS-DOS Versions 2.0 and higher incorporate the *hierarchical directory system*. This term means that one directory leads to another, which can lead to another, and so on. This multilevel file structure enables you to create a filing system for your files. Hierarchical directories are like the library's system of storing books and breaking them down by ever-narrower subject categories.

Computer people use the term *tree structure* to describe the organization of files into hierarchical levels of directories. Try picturing the tree structure as an inverted tree. You can visualize the file system with the first-level directory as the root or trunk of the tree. The trunk branches into major limbs to the next level of directories under the root. These directories branch into other directories. Directories have files, like leaves, attached to them. The terms *directory* and *subdirectory* are interchangeable.



DOS's directory structure, viewed as a tree-structure hierarchy. The root directory is the topmost directory.



The numbered boxes represent directories on branches of the tree-structured hierarchy.

The tree-structure analogy loses some of its neatness when it expands to cover the capabilities of the hierarchical directory structure. Any directory, except the root, can have as many subdirectories as space on the disk permits. Depending on the disk drive, the root directory can handle a preset number of subdirectories. In the 5 1/4-inch size, 360K floppies hold 112 entries and 1.2M floppies handle 224 entries in the root directory. In the 3 1/2-inch size, 720K

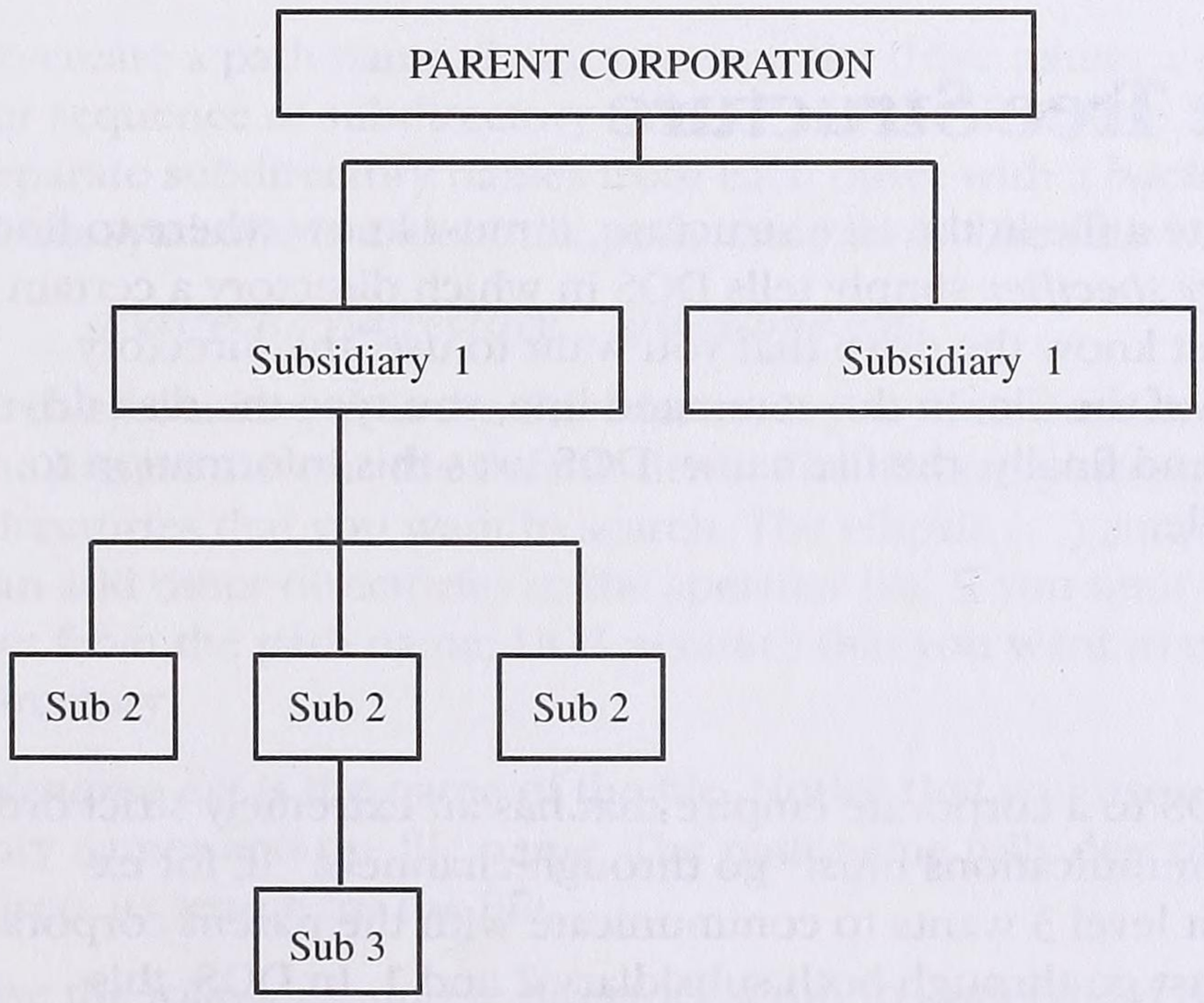
and 1.4M floppies can hold, respectively, 112 and 224 entries. Hard disks have a typical root directory capacity of 512 entries.

When you format a disk, DOS creates a main directory for that disk. This directory is called the *root directory*. The root directory is the default directory until you change to another directory. DOS designates the root directory with the backslash (\) character. You cannot delete the root directory.

A *subdirectory* is any directory, excluding the root directory. A subdirectory can contain data files as well as other, lower subdirectories. Subdirectory names must conform to the naming rules for DOS files, but subdirectory names normally do not have extensions. You should name subdirectories for the type of files that they contain. You then can remember what type of files each subdirectory contains.

The terms *directory* and *subdirectory* frequently are used interchangeably. A subdirectory of the root can have its own subdirectories. By naming the branches, you can describe where you are working in the tree structure. You simply start at the root and name each branch that leads to your current branch.

Disk directories also are frequently called "parent" and "child" directories. You can compare this structure to that of a diversified corporation with numerous subsidiaries. Each "child" of the parent can have "children" of its own. In the directory hierarchy, each directory's "parent" is the directory just above it.



A corporate command structure is similar to the disk directory concept.

Directories do not share information about their contents with other directories. In a way, each subdirectory acts as a disk within a bigger disk. This idea of privacy extends to the DOS commands that you issue. The directory structure permits DOS commands to act on the contents of the current directory and leave other directories undisturbed.

When you issue a command that specifies a file, but not a directory, DOS looks for that file in the default, or current, directory. You can access any point in the tree structure and remain at your current directory.

When you think about it, the tree analogy is not easy to envision. The inverted tree concept is as awkward as picturing the Empire State Building torn from its base and turned upside down. You can think of the building's foundation as the root directory and the exposed plumbing as subdirectories, but the image is still awkward.

Then again, there is an organic logic to the tree analogy. Any squirrel will tell you that you cannot reach the farthermost branch of a limb without starting from the limb nearest the base. From there, the limb branches off to several others. They, in turn, branch off still farther. The important thing to note is that you cannot use more than one limb to reach any of the limb's potentially numerous branches.

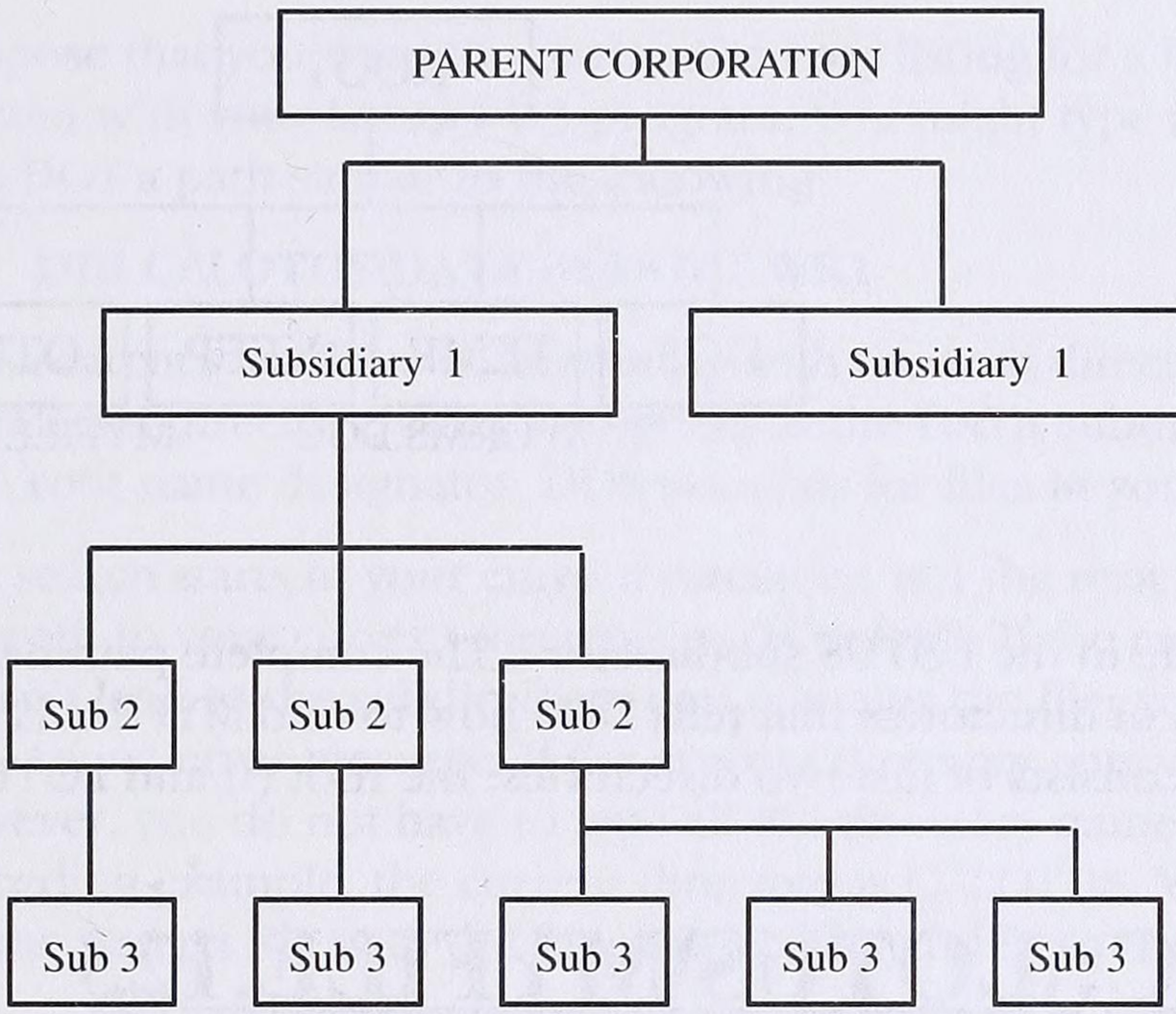
Consider a directory path as a series of stopping points on the way to a destination.

Paths in the Tree Structure

Before DOS can locate a file in the tree structure, it must know where to find the file. The *directory specifier* simply tells DOS in which directory a certain file resides. DOS must know the drive that you want to use, the directory name, and the name of the file. In the command line, you type the disk drive, the directory name, and finally, the file name. DOS uses this information to find and act on the file.

Path Names

You can compare DOS to a corporate empire that has an extremely strict order of command. All communications must "go through channels." If, for example, a subsidiary at level 3 wants to communicate with the parent corporation, the message must go through both subsidiary 2 and 1. In DOS, this routing is called a *path*.



A *path name* is a chain of directory names that tells DOS how to find the file that you want. You must build complete path names when you use the DOS prompt. When you use the Shell, the paths are supplied visually in the Directory Tree area. If you understand paths now, you can use the command line easily later.

To create a path name chain, you type the drive name, a subdirectory name (or sequence of subdirectory names), and the file name. Make sure that you separate subdirectory names from each other with a *backslash* (\) character. Using symbolic notation, the path name looks like this:

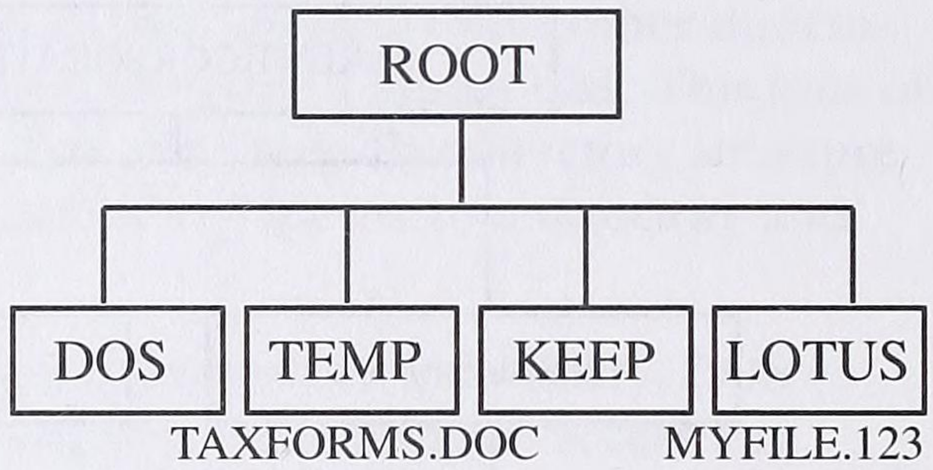
d:\directory\directory. . .\filename.ext

In this notation, *d:* is the drive letter. If you omit the drive specifier, DOS uses the logged drive as the default drive. The *directory\directory. . .* names the directories that you want to search. The ellipsis (...) simply means that you can add other directories to the specifier list. If you omit the directory specifier from the path name, DOS assumes that you want to use the current directory.

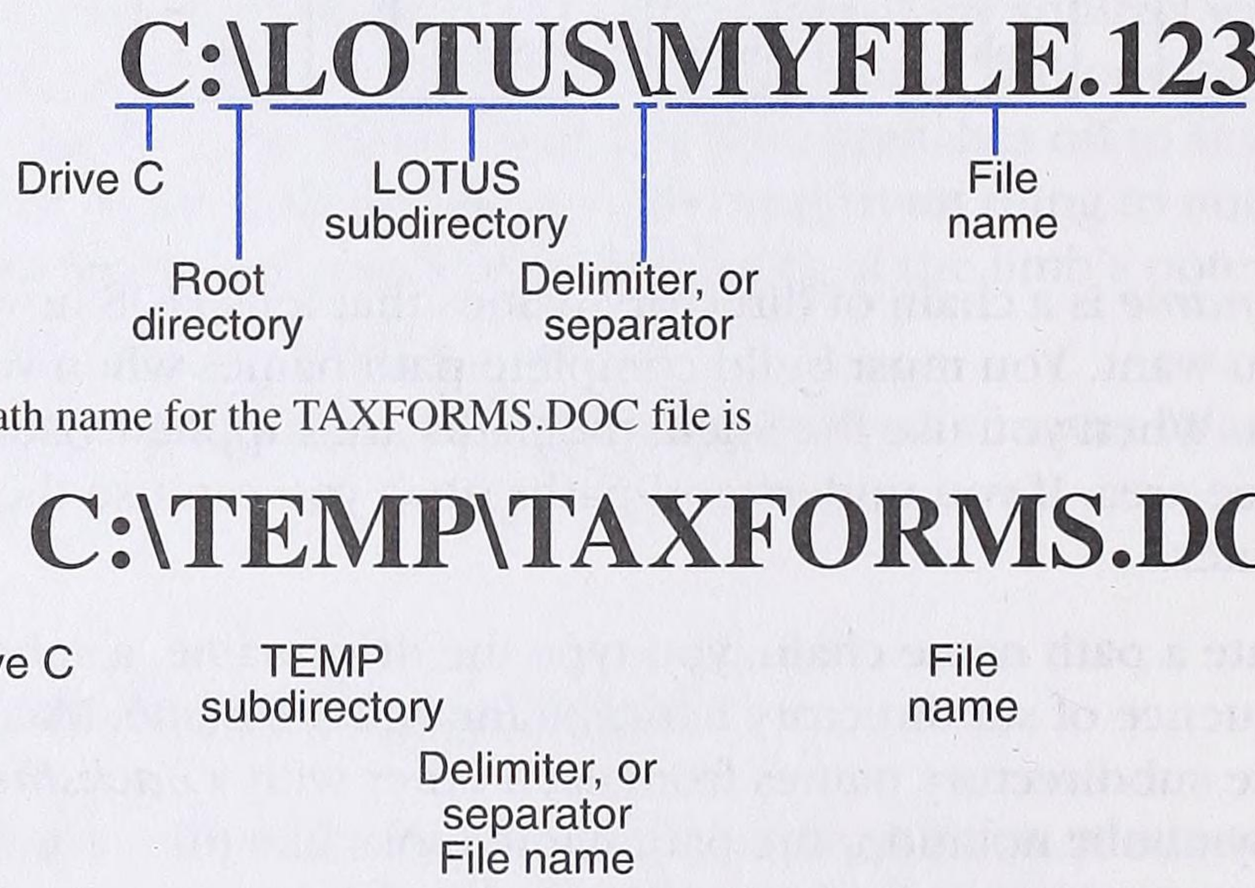
filename.ext is the name of the file. Notice that you use a \ to separate directory names and the file name. The path name fully describes to DOS where to direct its search for the file.

Use the following simple directory setup to understand directory paths in DOS. Each subdirectory in this sample is a subdirectory of the root directory.

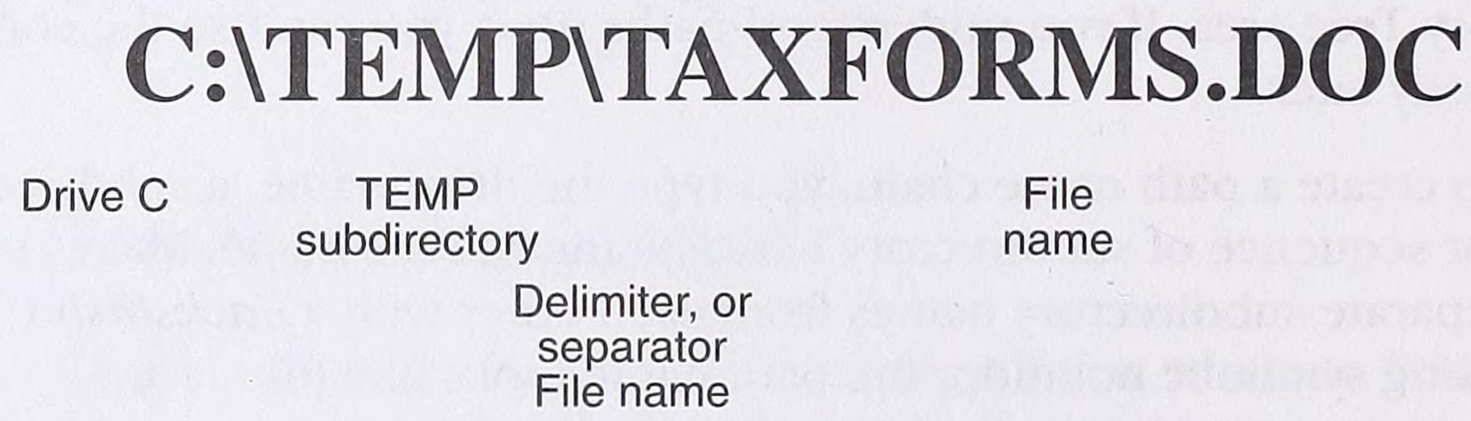
The subdirectory called LOTUS has a data file called MYFILE.123. Another subdirectory, TEMP, has a file called TAXFORMS.DOC.



MYFILE.123 is a data file in the LOTUS subdirectory. The complete path name for this file is the chain of directories that tells DOS how to find MYFILE.123. In this case, the chain consists of just two directories: the root (\) and LOTUS. The path name is



The path name for the TAXFORMS.DOC file is



Where the Search Starts

When you type a path name, DOS searches in the first specified directory. It then passes through the other specified directory branches to the file. The root directory has no name and is represented by the backslash (\). All directories grow from the root directory. If you want the search path to start at the root directory, begin the directory specification with a \. DOS begins its search for the file in the root and follows the subdirectory chain that you include in the command.

Suppose that you want to see the directory listing for a budget file that you created with your Lotus 1-2-3 program. You might type a **DIR** command to give DOS a path similar to the following:

```
DIR C:\LOTUS\DATA\BUDGET.WK1
```

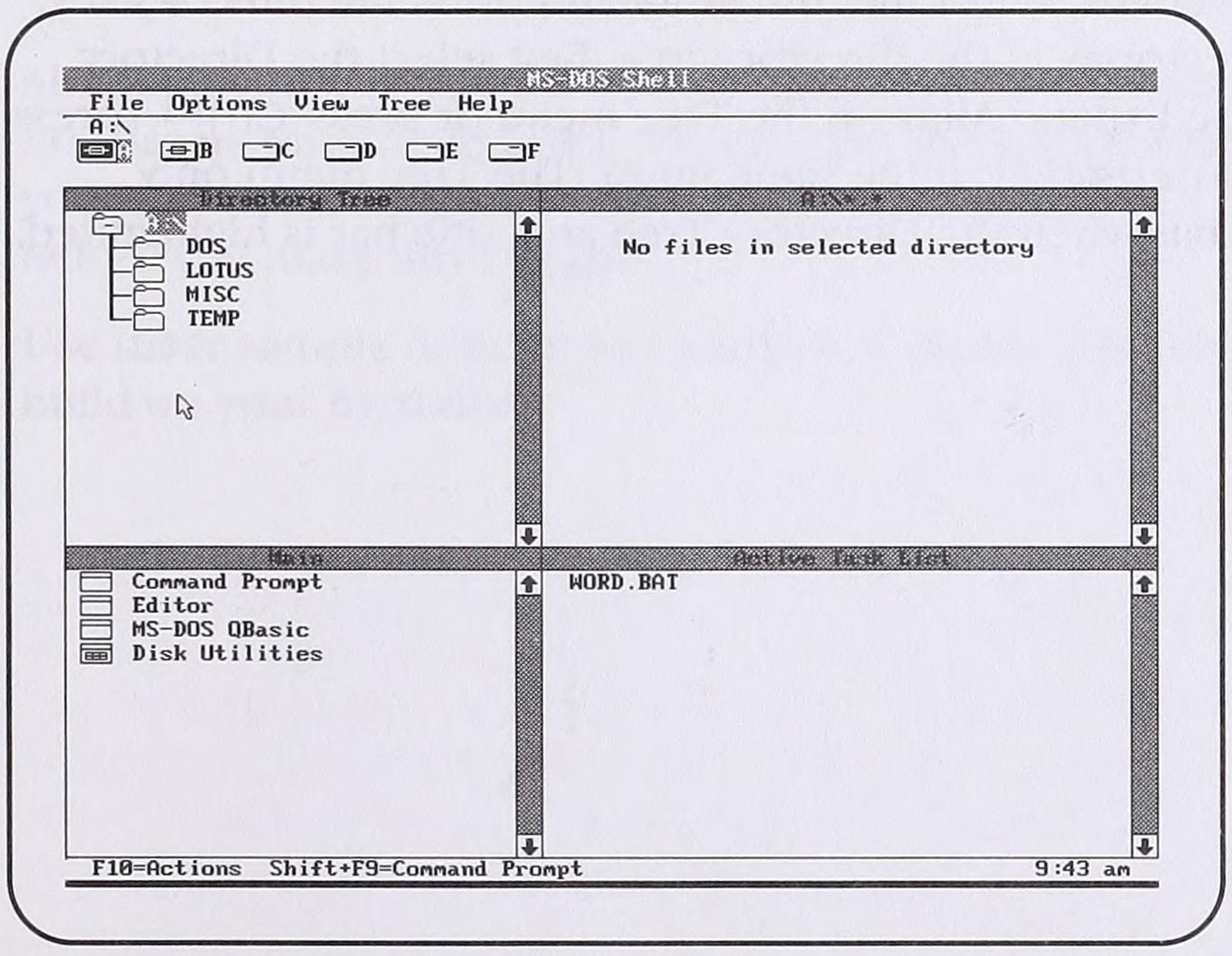
DOS searches on drive C, beginning with the root directory, proceeds to the LOTUS subdirectory, and then arrives at the DATA subdirectory. If you omit the \ root name designator, DOS searches for files in your current directory.

The search starts in your current directory, not the root directory. DOS uses the path to your current directory as its default. If the current directory doesn't lead to the subdirectory that contains the file, you will receive a `file not found` error message. If the current directory contains the subdirectory, however, you do not have to type all the directory names in the path. In the preceding example, the current directory is C:\LOTUS. You can see the listing for the budget file with the following command from the DOS prompt:

```
DIR DATA\BUDGET.WK1
```


Viewing the Directory Structure

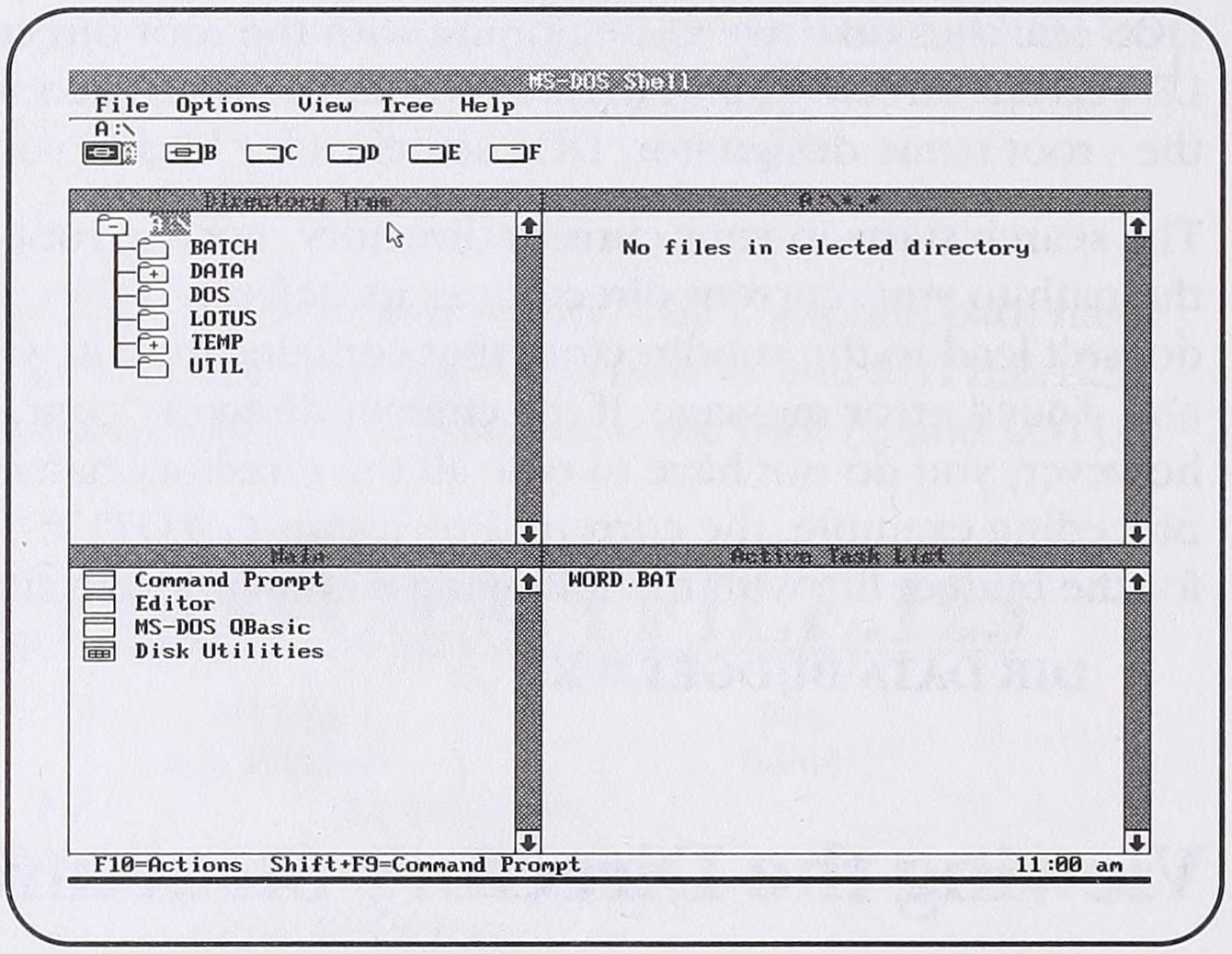
In the last chapter, you saw some rather complex hard disk directory structures. Here, you will start with some simple directory structures using drive A. Although floppy drive A is used here as a sample, these directory structures really are more applicable to hard disks, not floppy disks.



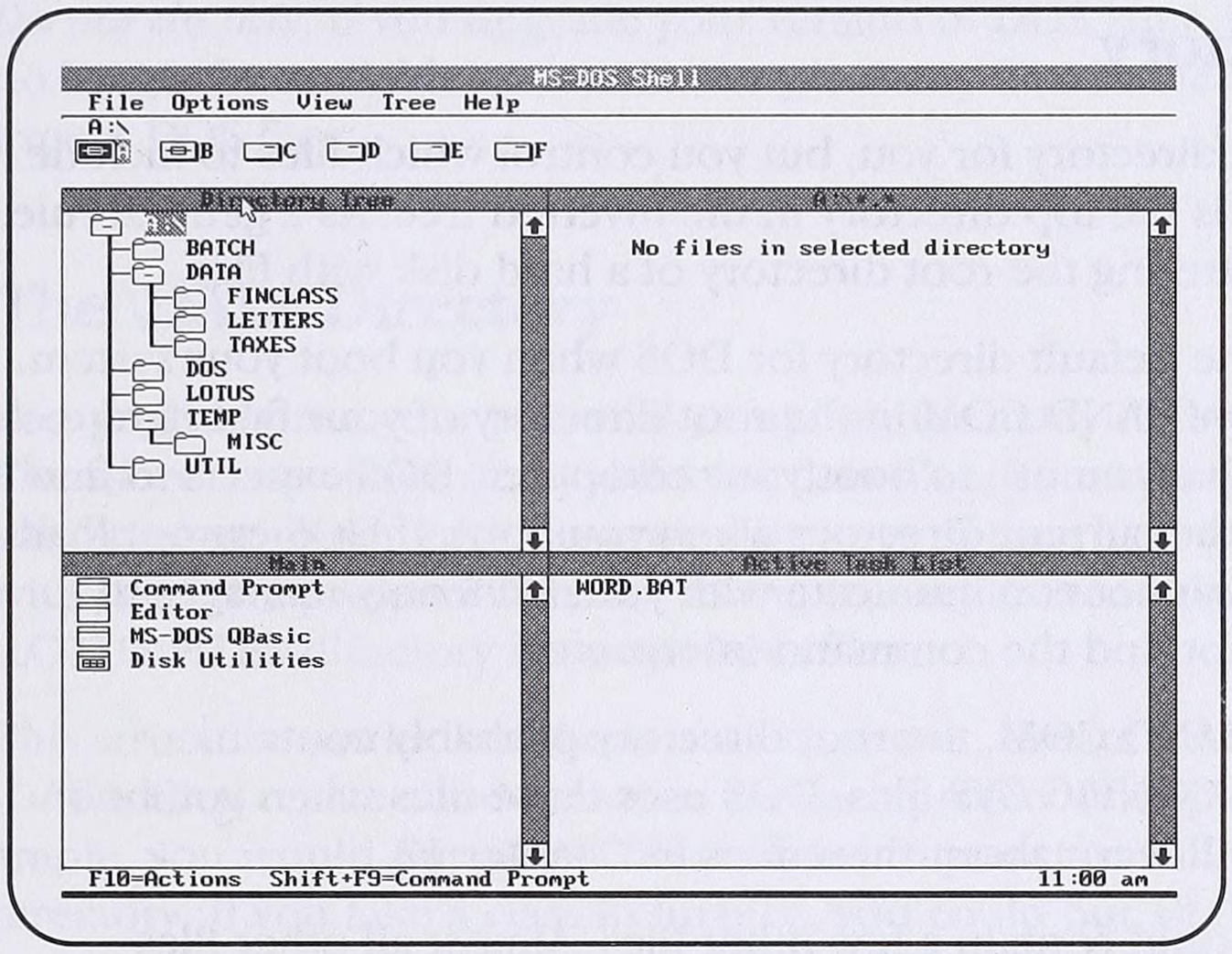
A variety of arrangements for the directory structure is possible. This sample structure has four subdirectories under the root.

Many times, a second level of directories is useful. For example, you may want to group a series of related program directories under one directory, or group a number of data directories under one directory. Many people find that two levels of subdirectories are sufficient.

This sample directory structure has two levels of directories under the root. Only the first level appears. If a directory has additional levels of subdirectories under it, a plus sign (+) appears in the file folder icon.



When you see a plus sign in a file folder icon for a directory, you can *expand* the directory listing to see the subdirectories for that directory. To expand a single directory with a mouse, click on the plus sign. To expand a single directory with the keyboard, select that directory and press the plus (+) key. To expand all the directories in the directory tree, first select the Directory Tree area, then choose Expand All from the Tree menu or press Ctrl-* (press the Ctrl key and the asterisk key at the same time). The Tree menu only appears in the menu bar when the Directory Tree area title bar is highlighted.



This sample directory structure has a DATA directory with three subdirectories.

When you see a minus sign (–) in a file folder icon for a directory, you can *collapse* the directory listing to hide the subdirectories for that directory. To collapse a single directory with a mouse, click on the minus sign. To collapse a single directory with the keyboard, select that directory and press the minus ( ) key.

Exploring Sample Subdirectories

Although you may not know what kind of directory organization you need, now is a good time to give some thought to establishing your directory tree. If your computer is part of a network, check with the network administrator before you make any changes.

Use these sample directories to help you decide what directories you want to build on your hard disk.

The Root Directory

DOS creates the root directory for you, but you control which files to include in the root. The root is the top directory in the inverted tree. As a general rule, you should avoid cluttering the root directory of a hard disk with files.

Because the root is the default directory for DOS when you boot your system, you must include COMMAND.COM in the root directory of your first hard disk and any floppy disk that you use to boot your computer. DOS expects to find COMMAND.COM in the current directory when you boot. If DOS cannot load COMMAND.COM, it cannot communicate with you. DOS only manages to warn you that it cannot find the command interpreter.

In addition to COMMAND.COM, the root directory probably contains AUTOEXEC.BAT and CONFIG.SYS files. DOS uses these files when you boot the computer. You will learn about these files in Chapter 12.

The root directory should contain a few other files. Almost all other files should find a home in an appropriate subdirectory.

The \DOS Directory

When you install DOS on your hard disk, the installation procedure creates the \DOS directory and copies the DOS files into this directory.

The \BATCH Directory

Batch files are text files that contain DOS commands and execute programs. You can place many commands in one batch file. Even if you use the Shell to execute commands and programs, you still will use batch files. Most users keep their batch files in a separate \BATCH directory. You will learn more about batch files in Chapter 12.

The \UTIL or \UTILITY Directory

Just as you keep all your DOS files in the \DOS directory, you may want to keep utility programs in their own directory. Most people accumulate a variety of small utility programs such as print spoolers, mouse drivers, file compression utilities, disk utilities, and so on, and keep them in the \UTIL or \UTILITY directory. Some people place these utility programs in the \DOS directory.

Do not do this. If you upgrade your version of DOS later, these programs may no longer be available to you. Never place any files in the \DOS directory except DOS files.

The \DATA Directory

You probably use your personal computer for many different purposes. Therefore, you create many different data files. Some people create a data subdirectory under each program directory. If they have a \LOTUS directory with the 1-2-3 program files, for example, they create a \LOTUS\DATA or \LOTUS\FILES directory for worksheet files.

This structure works, but there is a better one. Create a directory called \DATA, then create subdirectories for each project or application. For example, you would put all the files related to your taxes in the \DATA\TAXES directory. If you take a class in finance, you could put all the homework assignments in the \DATA\FINCLASS directory. The \DATA\FINCLASS directory might contain both worksheet files and word processing files, but they are all related to one activity.

With a \DATA directory, you can back up your data easily without making a backup copy of your programs. Creating backups is covered in Chapter 10.

The \TEMP Directory

Many users find that they need a directory to store temporary files. You might find a directory named \TEMP useful. You can copy files to \TEMP as a temporary storage place until you copy the files to a more appropriate directory. A \TEMP directory also is useful for making copies of floppies in a single floppy, low-memory system.

You can copy files from the source disk to the \TEMP directory and then copy them back to the destination disk. If you have a single floppy drive, this copy method keeps you from swapping disks in and out of the single floppy drive.

Do not use the \TEMP directory as a permanent home for a file, however. You should be able to erase all the files in this directory periodically. This keeps the \TEMP directory empty for later use.

If you are using Microsoft Windows, you must use caution with a TEMP directory. When you install Windows, a directory is created to store temporary files. The default for this directory is C:\WINDOWS\TEMP. Because Windows

uses these files, you should never delete any files from the Windows temporary directory while Windows is running. If the Windows temporary directory is C:\WINDOWS\TEMP, you can use C:\TEMP without causing any problems. Although the directories both have the name TEMP, the complete paths are different so that DOS knows that the two directories are different and unrelated.

The \MISC or \KEEP Directory

You may have files in different directories that are no longer active, but that you believe you may still need. Inactive files in a directory tend to increase clutter and make sorting through the directory confusing. With a \MISC or a \KEEP directory, you have an easily remembered home for those inactive files. Of course, you should delete only those files that are obviously of no more use to you.

Applications Software Directories

Many applications packages create directories when you install them on your hard disk. But if no directory is created by a program, it's a good idea to create one with a name that suggests the software name. For example, you might name your spreadsheet directory LOTUS. You can then copy the 1-2-3 package's files to the directory.

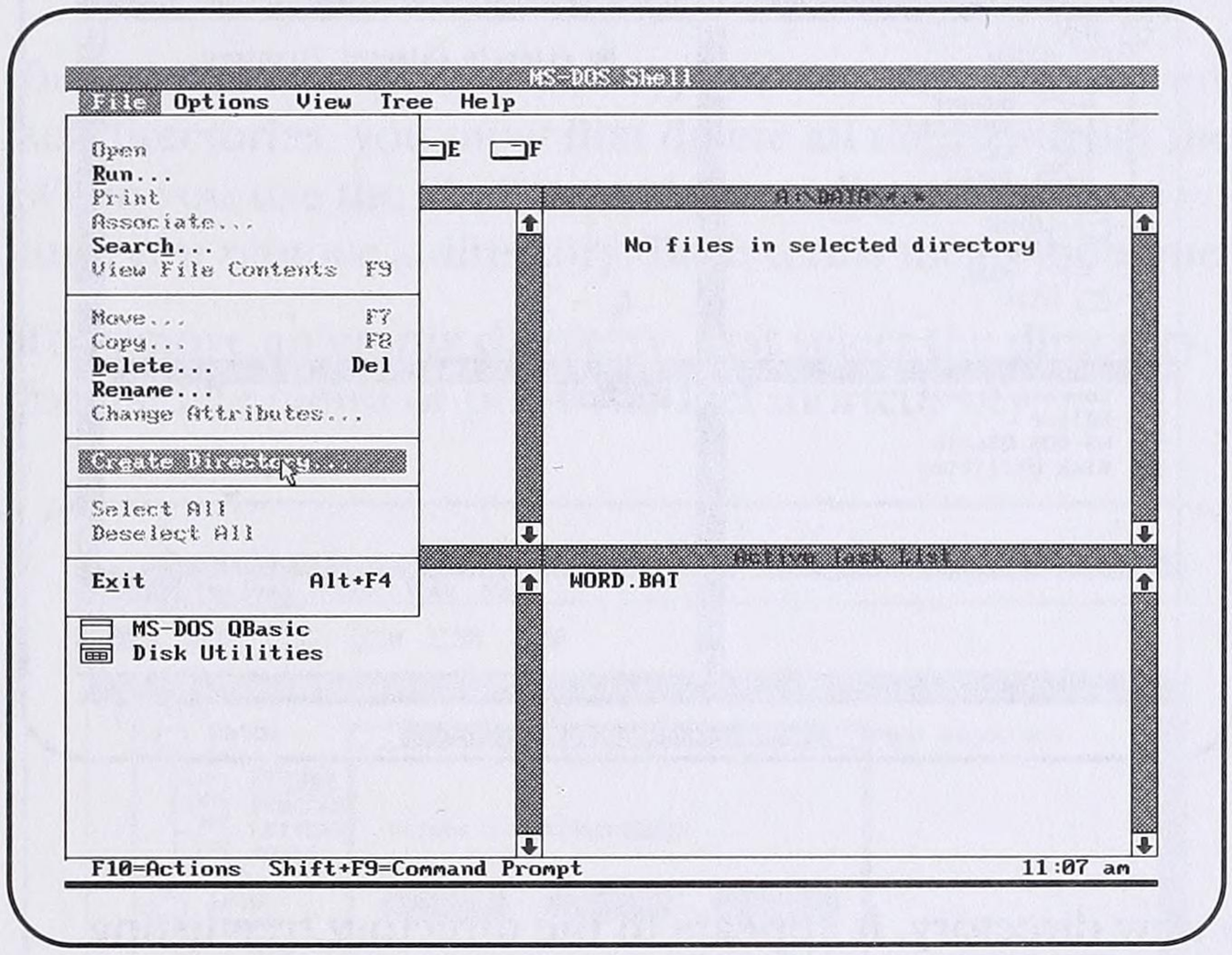
If you work with multiple versions of the same program, you might name a subdirectory 123R22 for the 1-2-3 Release 2.2 program files and 123R3 for the 1-2-3 Release 3 program files. If you have enough disk space, you should keep both the old version and the new version of a program available for a while in case you have problems with the new version.

Managing a Hard Disk Drive

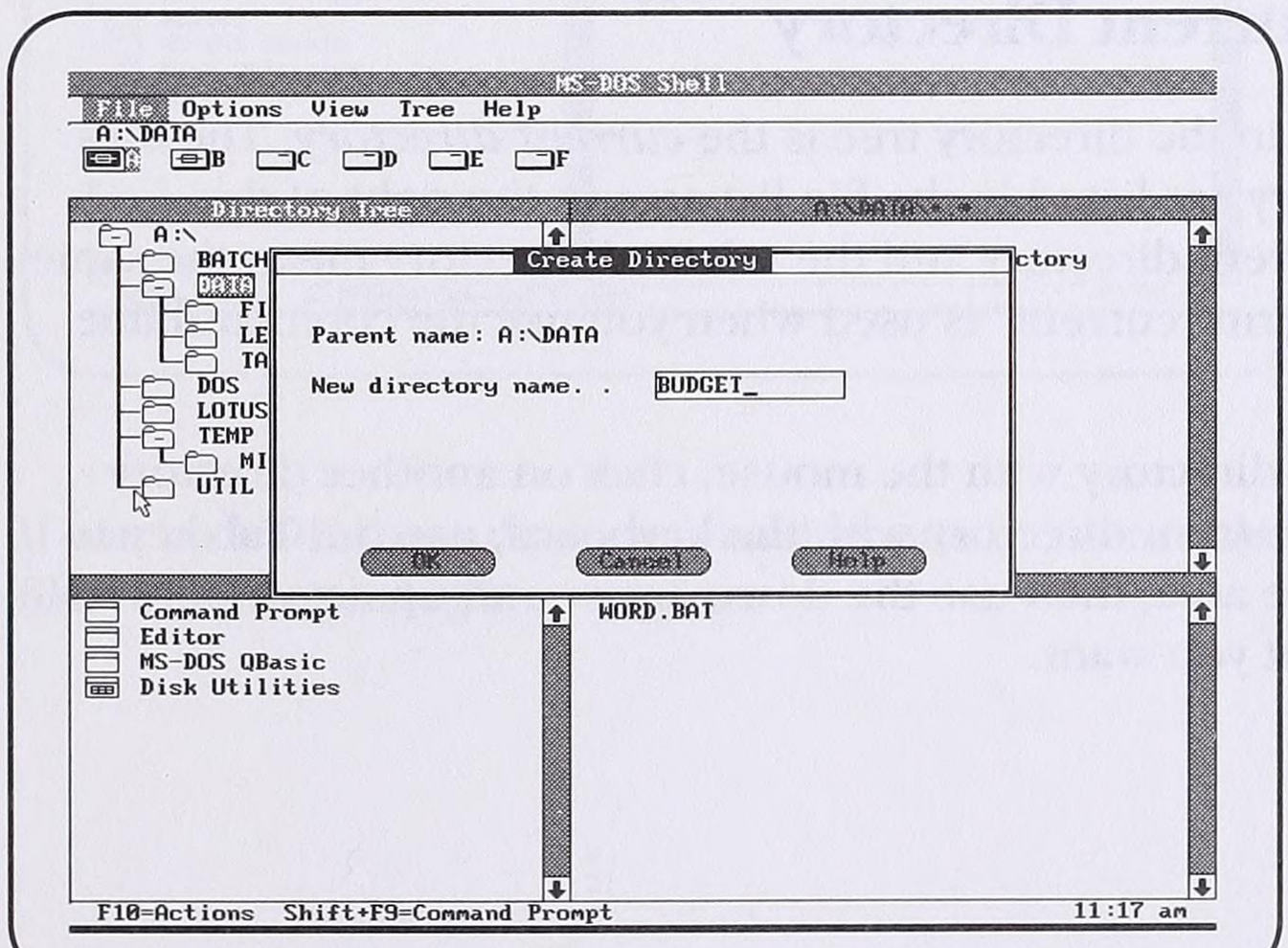
The examples presented so far in this chapter provide information on the structure of hierarchical directories. The following commands relate to your directory system's maintenance and use. With directory commands, you can customize your file system and navigate through it.

Creating a New Directory

To make a new directory, first select the *parent* directory where you want to add a subdirectory. If you want to add a subdirectory to the root, select the root directory.

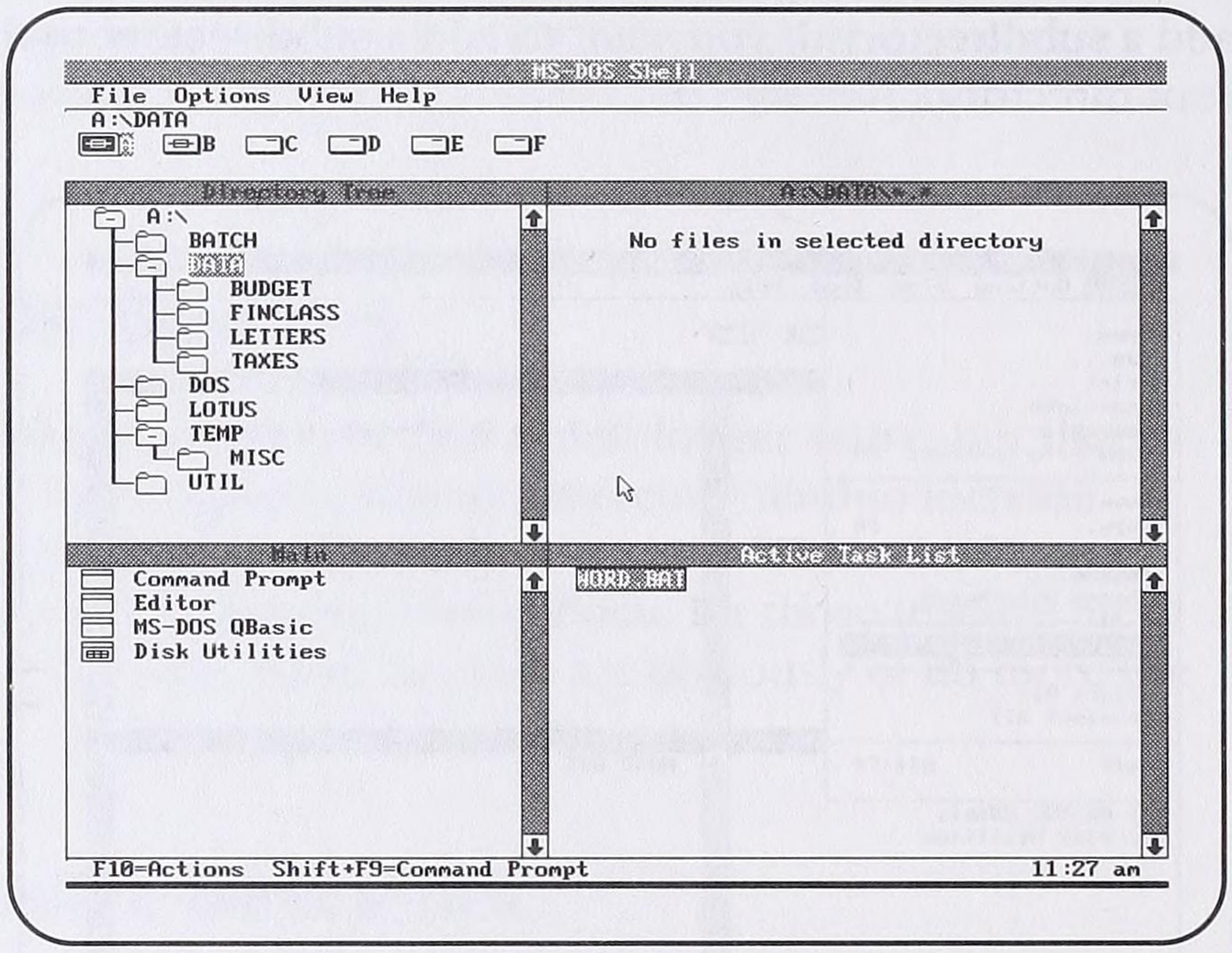


Select Create Directory from the File menu to create a new directory under the selected directory. You then see the Create Directory dialog box.



Type the name of the new directory in the text box. A directory name must be a valid file name of one to eight characters. File extensions are rarely used for directory names.

After you type in the new directory name, choose OK to complete the command.



\DATA\BUDGET added to directory tree

As soon as you create a new directory, it appears in the directory tree listing.

Changing the Current Directory

The directory selected in the directory tree is the *current directory*. The files for the current directory are listed in the file list area to the right of the directory tree. The current directory and the selected directory mean the same thing. Generally, the term "current" is used when you use the command line instead of the Shell.

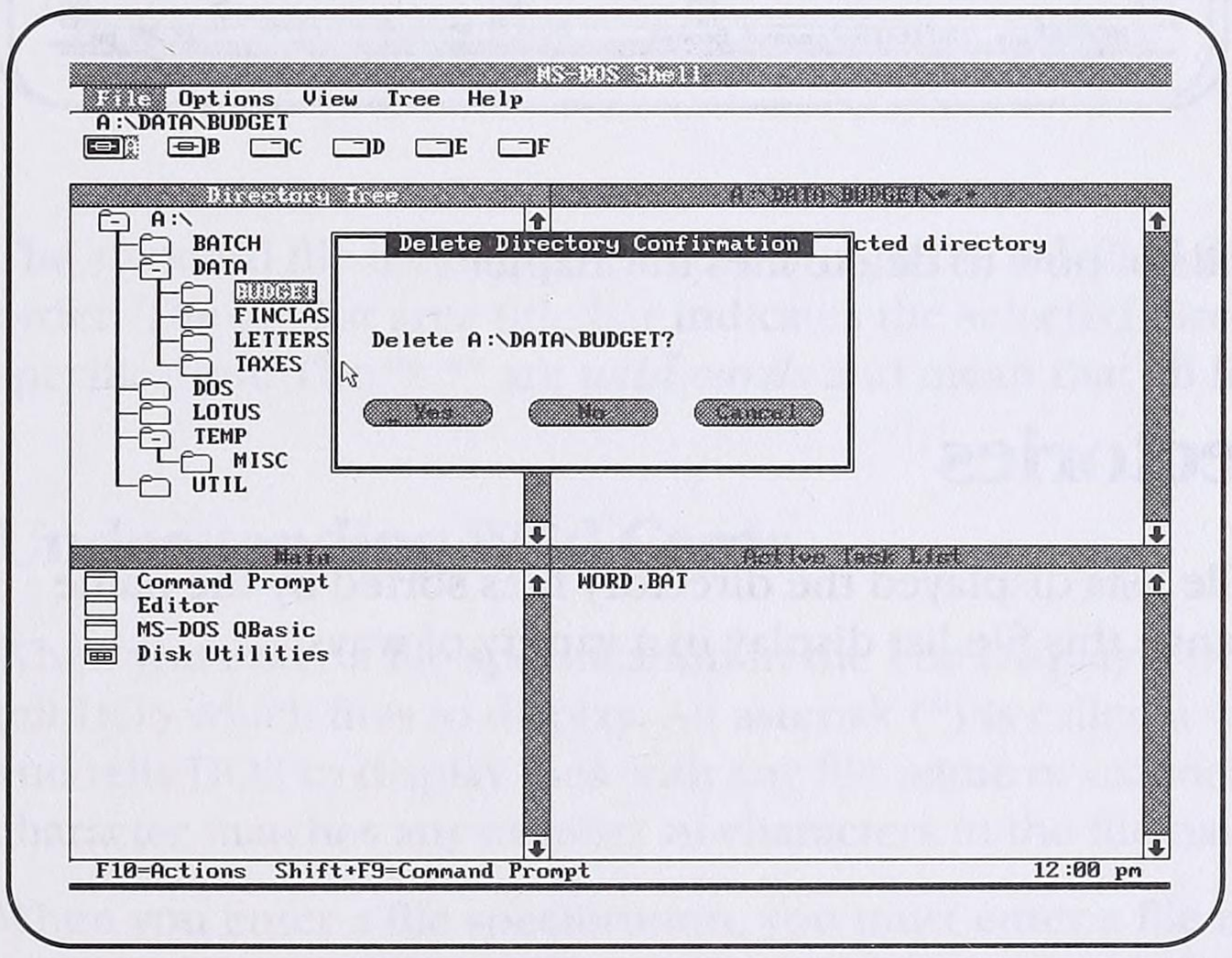
To change the current directory with the mouse, click on another directory name. To change the current directory with the keyboard, use the **Tab** key to select the directory tree area, then use the down arrow and up arrow keys to select the directory that you want.

If the directory that you want to select is a subdirectory of another directory and does not appear on the directory tree, expand the directory tree and then select the subdirectory.

Removing a Directory

Before you remove a directory, the directory must be empty of all files and subdirectories; you must first delete all the files from the unwanted directory. When you use the Shell, you *delete* a directory. When you use the command line, you *remove* a directory. Both terms mean the same thing.

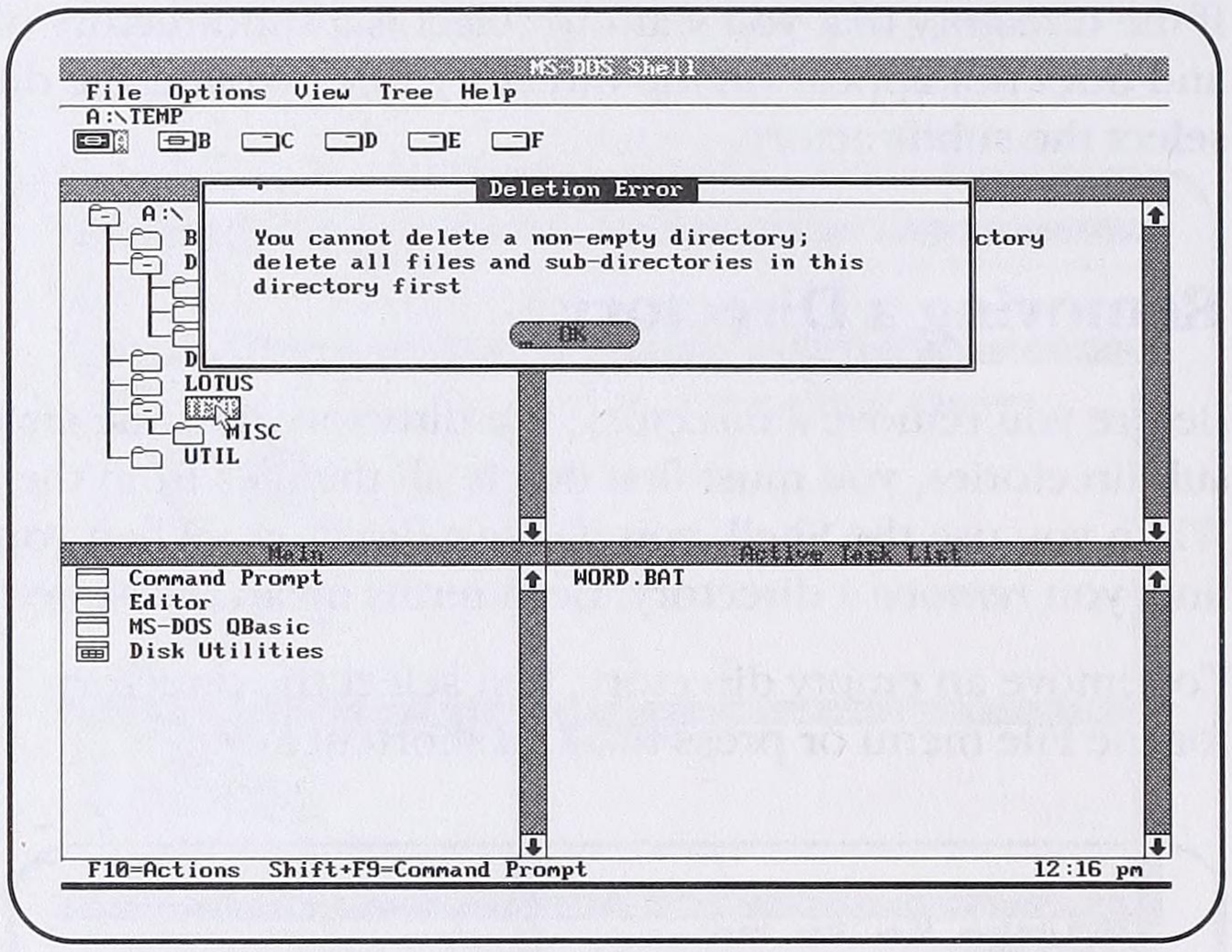
To remove an empty directory, first select the directory. Then choose Delete for the File menu or press the **Del** shortcut key.



When you delete a directory, a confirmation dialog box appears. Select Yes to remove the directory or choose No or Cancel if you do not want to remove it.

If you try to delete a directory that has one or more subdirectories or contains files, an error dialog box appears.

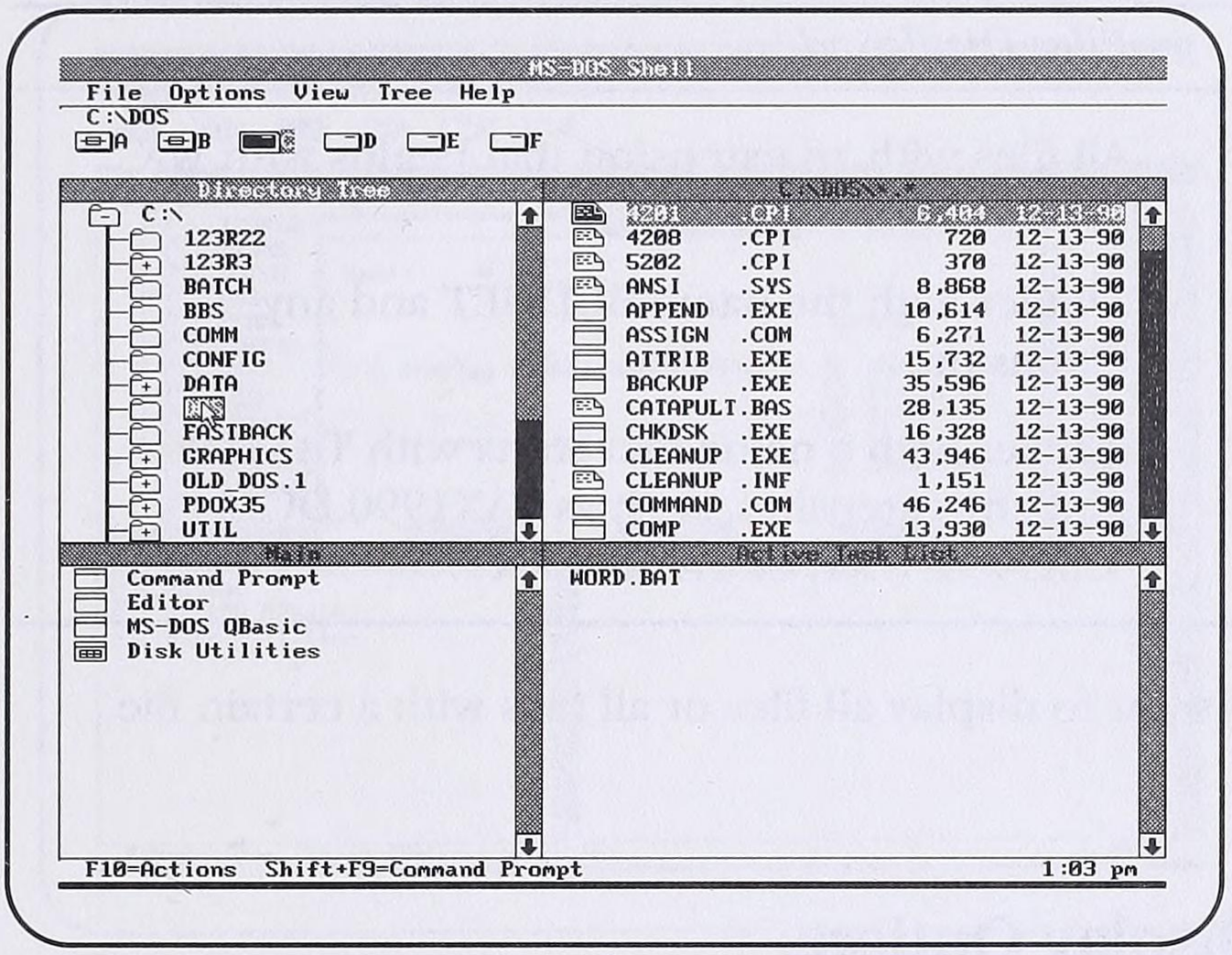
The selected TEMP) directory has a subdirectory MISC, so you cannot delete TEMP until you delete MISC. Select OK to clear the error dialog box and cancel the command.



You will learn the details of how to delete files in Chapter 7.

Viewing Directories

Up until now, all the file lists displayed the directory files sorted by the name of the file. You can change this file list display in a variety of ways.



Directory and file specification

The standard file list displays all the files in the selected directory in file name order. The file list area title bar indicates the selected directory and the file specification. The "*.*" are *wild cards* and mean that all files are displayed.

Understanding Wild Cards

When you enter a file specification in the File Display Options dialog box, you tell DOS which files to display. An asterisk (*) is called a wild-card character and tells DOS to display files with any file name or extension. The asterisk character matches any number of characters in the file name or extension.

When you enter a file specification, you must enter a file name, a period to separate the name from the extension, and an extension. The default *.* file specification means to display files with any file name and any file extension.

You can change the file specification to restrict what files are displayed:

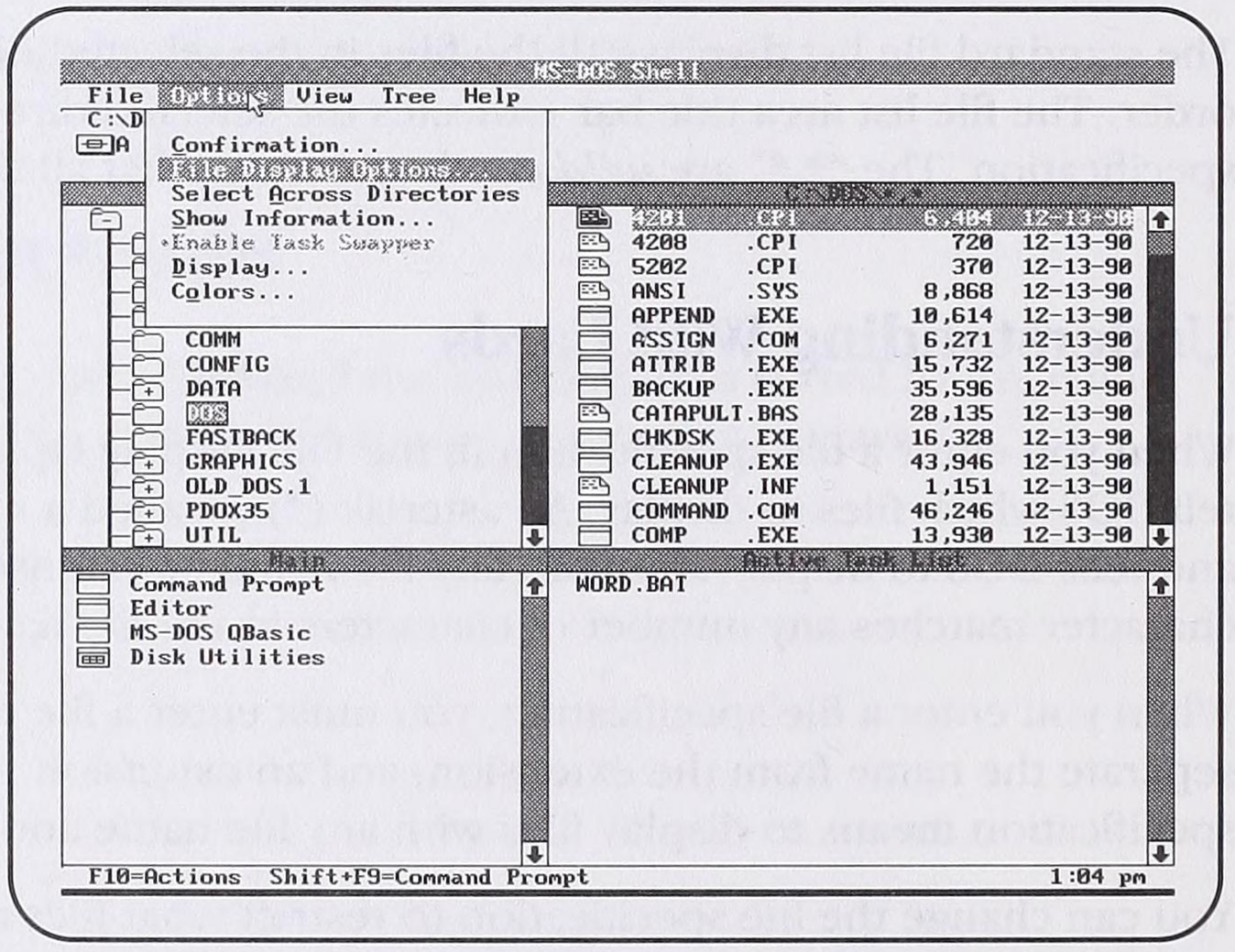
File Specification	*Files Displayed*
.	All files.
***.BAS**	All files with a BAS extension.
***.DOC**	All files with a DOC extension.

File Specification	*Files Displayed*
.WK	All files with an extension that begins with WK, such as WKS or WK1.
BUDGET.*	All files with the name BUDGET and any extension.
TAX199*.*	All files with a name that starts with TAX199 and any extension, such as TAX1990.DOC, TAX1991.WK1, or TAX199.TXT.

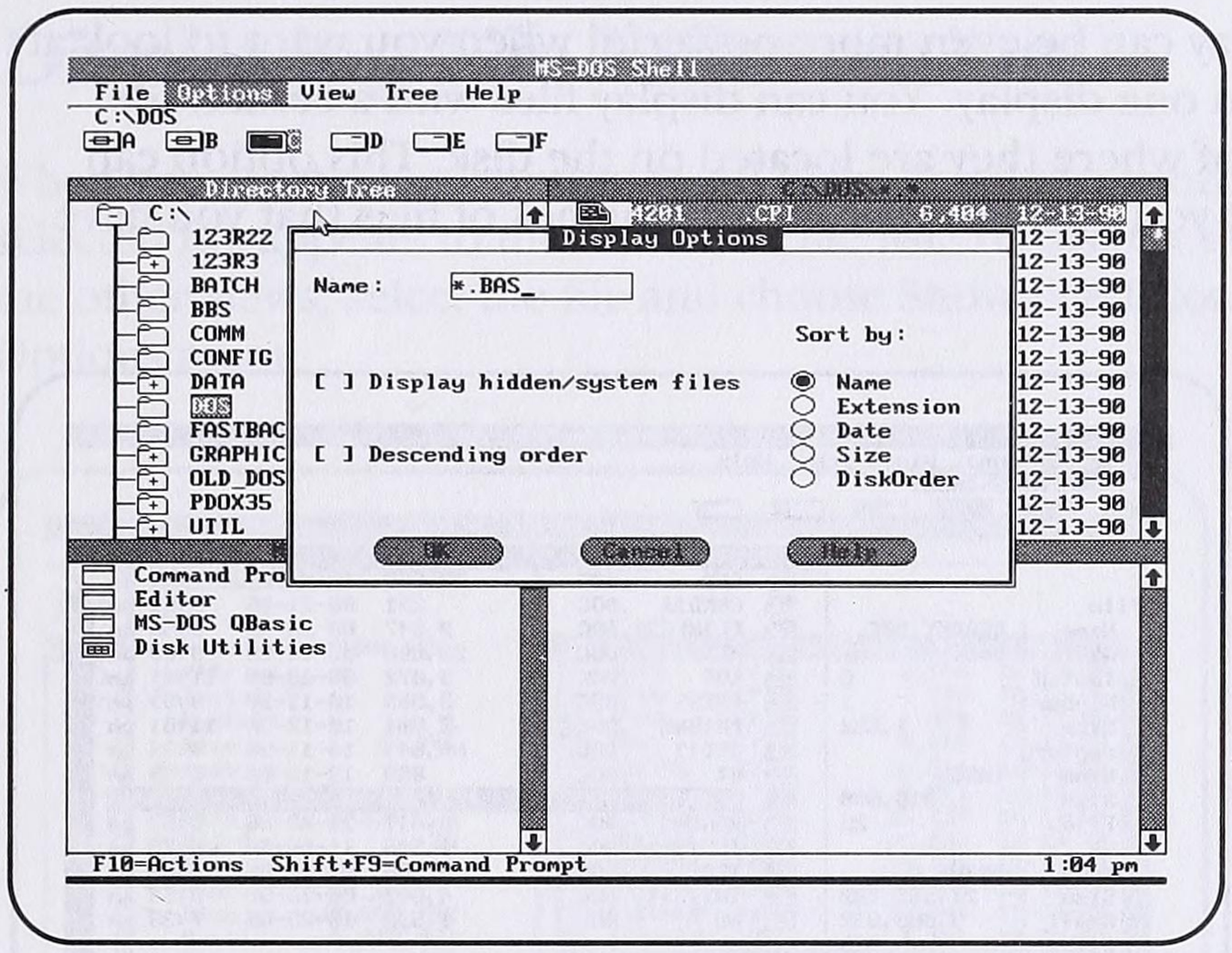
In most cases, you will want to display all files or all files with a certain file extension.

Changing File Display Options

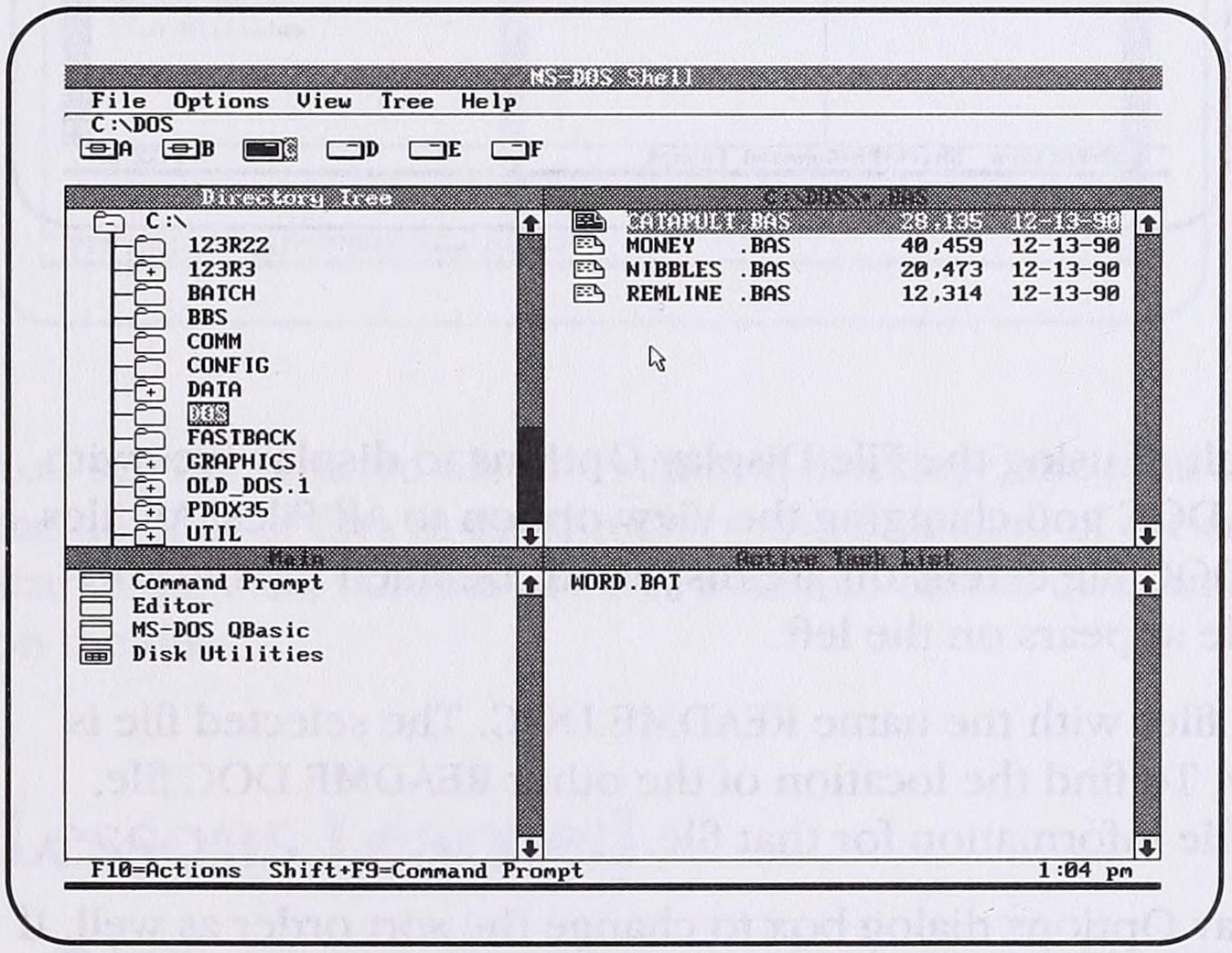
Select File Display Options from the Options menu to change the display of the file lists.



You can change the file display for many different reasons. For example, you may want to see only specific files from a directory with many files.



The Display Options dialog box enables you to change which files display and in what order they display. Here the file specification was changed to *.BAS to display only Basic program files. Select OK to complete the command.

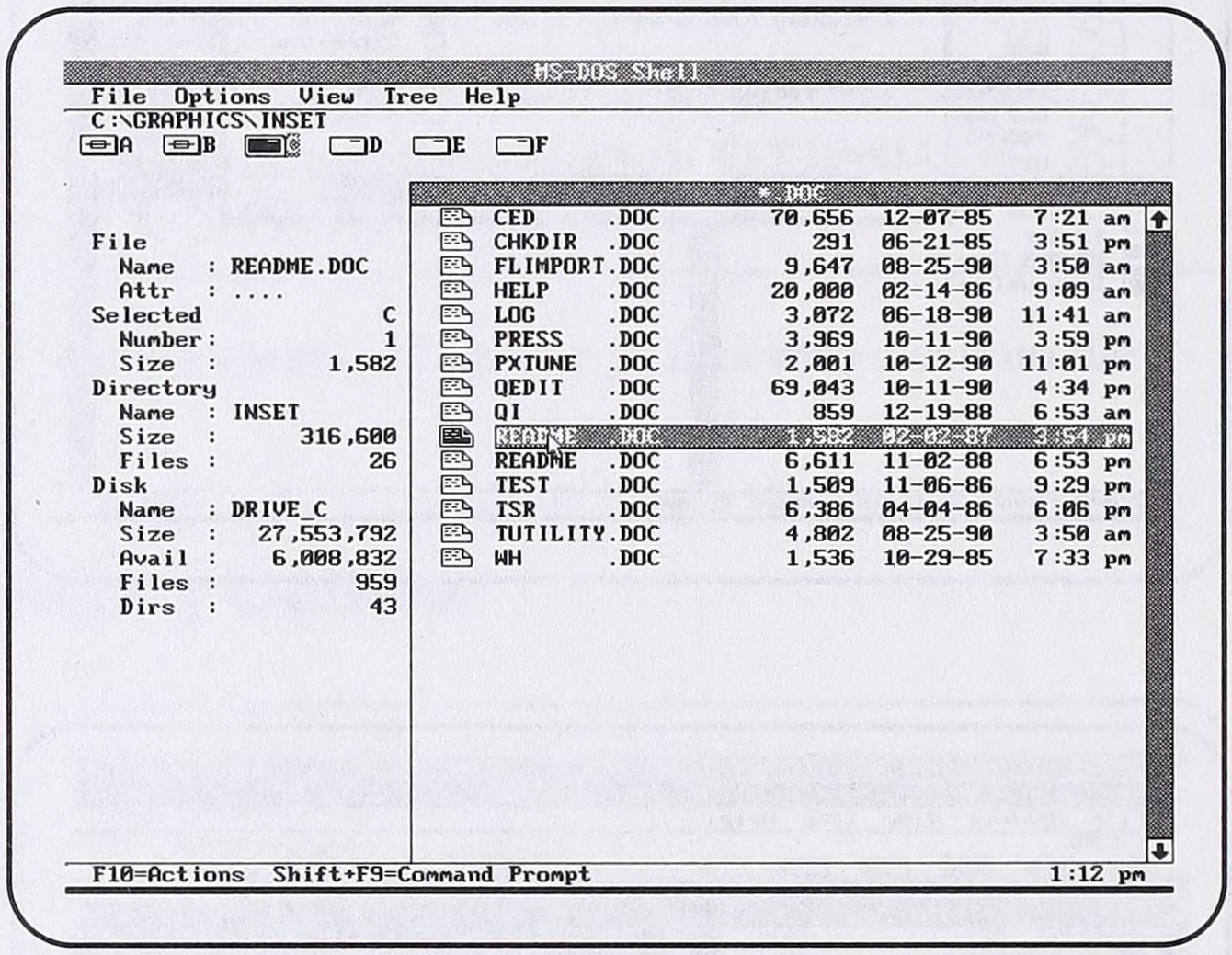


The file list area title bar shows that only files with a .BAS file extension are displayed.

The selective file display can be even more powerful when you want to look at all the files on a disk in one display. You can display files with a certain file extension, regardless of where they are located on the disk. This option can help you find files that you misplaced or find the names of files that you have forgotten.

5

All files with a .DOC file extension are displayed



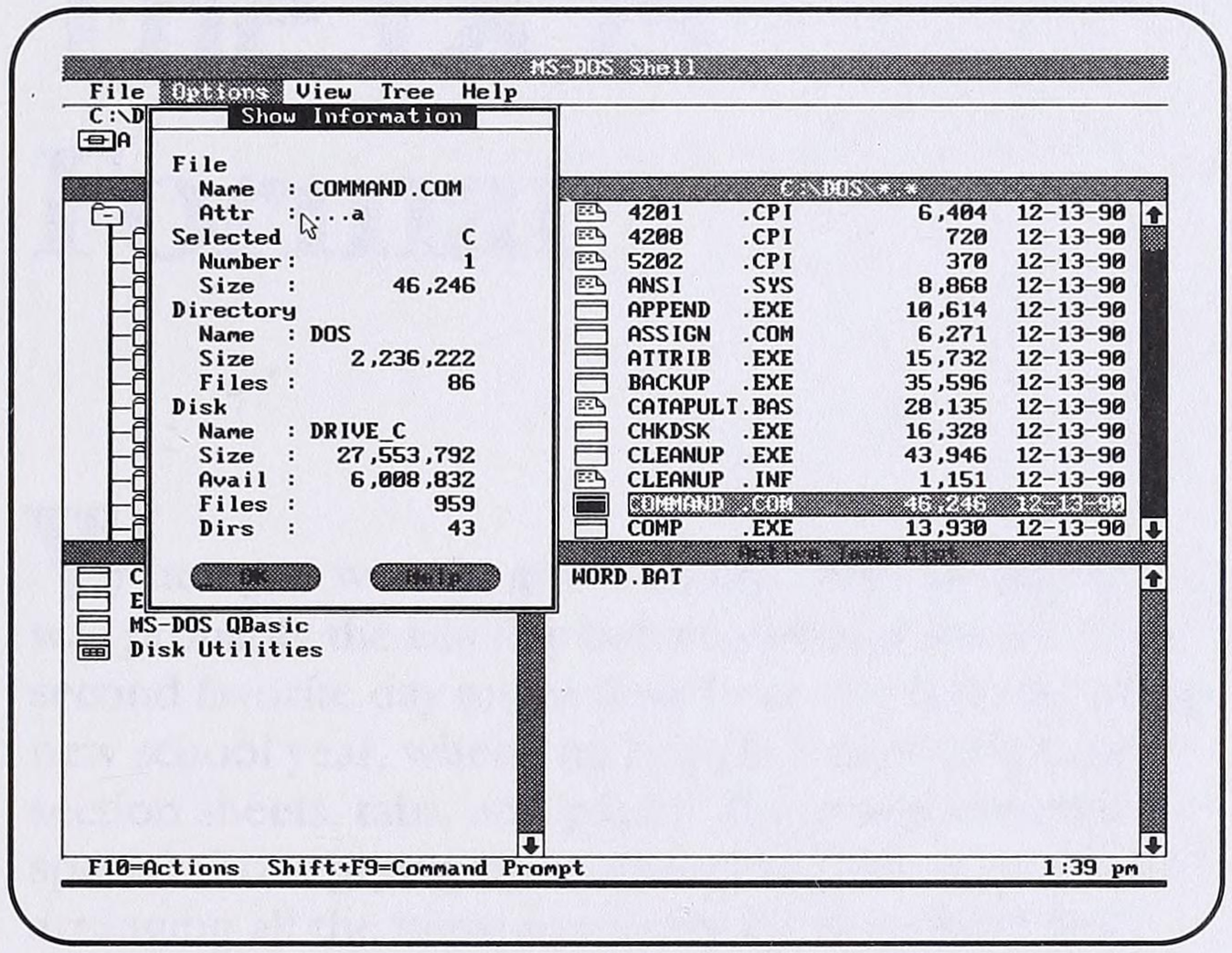
This display is the result of using the File Display Options to display files with the file specification *.DOC and changing the View option to All Files. All files on the disk with the .DOC file extension are displayed. Detailed file information on the selected file appears on the left.

The disk contains two files with the name README.DOC. The selected file is in the INSET directory. To find the location of the other README.DOC file, select it and read the file information for that file.

You can use the Display Options dialog box to change the sort order as well. If you are updating many files in a large directory, you may want to list the files by date or by date in descending order so that you can tell easily which files are new.

Displaying File Information

When you set the View option to All Files, detail file information for the selected file appears to the left of the file list. To display this information in the other views, select the file and choose Show File Information from the Options menu.



The Show File Information dialog box shows detailed information about the selected disk, directory, and file.

You see the selected file, the selected directory, the total size of the directory, the number of files in the directory, the disk label of the selected disk, total size of the disk, number of bytes available on the disk, and the number of files on the disk.

Lessons Learned

- DOS organizes directories in a manner similar to the way a library breaks down books by subject subgroupings.
- Although such terms as *root* and *tree* are established directory terminology, the directory concept is more like a foot path used for arriving at your destination.
- The path concept is essentially the mapping out of a course for DOS to search.

- The root directory is the beginning, or default, directory.
- You can create and remove directories easily with the Shell.
- You can view a directory listing many different ways.
- Detailed information about the current file, directory, and disk are only a menu choice away.

In the next chapter, you will learn how to prepare floppy disks.

6

The DOS Format

When you were in grade school, your favorite day was probably the last day before summer recess. Your second favorite day might have been the first day of the new school year, when you bought loose-leaf binders, section sheets, tabs, and paper. There was something special about prying open those big chrome rings and arranging all the items necessary for organized note taking. The paper was lined and pristine, everything was sectioned off, and labels identifying subjects were written as neatly as small fingers allowed. These notebooks would never be this neat again.

Preparing your computer to hold and organize information also can be a pleasing experience. If nothing else, reading this chapter teaches you how to format any MS-DOS disk, hard or floppy. Topics range from formatting different types of floppy disks, assigning volume labels, transferring system files, and understanding FORMAT error messages.

Learning how to format disks is easy if you accept the role of the patient student. The agreeable part of formatting disks is that DOS does it all. You don't even have to worry about poor penmanship.

Understanding floppy disks

Matching floppy disks and the disk drive

Formatting a floppy disk

Learning FORMAT switch options

Understanding FORMAT error messages

Formatting a hard disk: Cautions

Key Terms Used in This Chapter

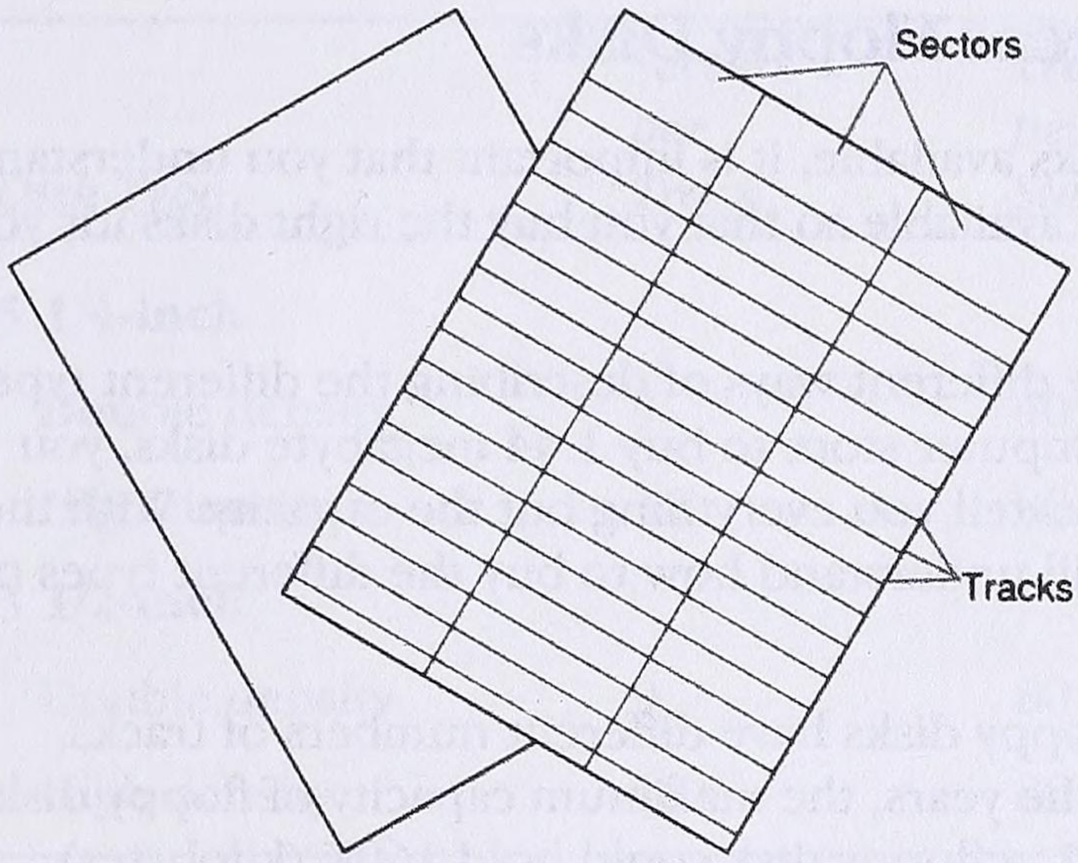
Format	Initial preparation of a disk for data storage.
Volume label	A disk-level name that identifies a particular disk.
Track	A circular section of a disk's surface that holds data.
Sector	A section of a track that acts as the disk's smallest storage unit.
Allocation unit	A group of sectors that DOS uses to keep track of files on the disk.
Unformat	To recover the files on a disk after it has been formatted.

Understanding Floppy Disks

A floppy disk is a Mylar pancake in a plastic dust cover. The Mylar disk is covered with magnetic material similar to the metallic coating on recording tape. Out of the box, disks usually aren't ready for you to use. You must *format* them first. Although you can buy disks that are formatted, few stores currently carry them.

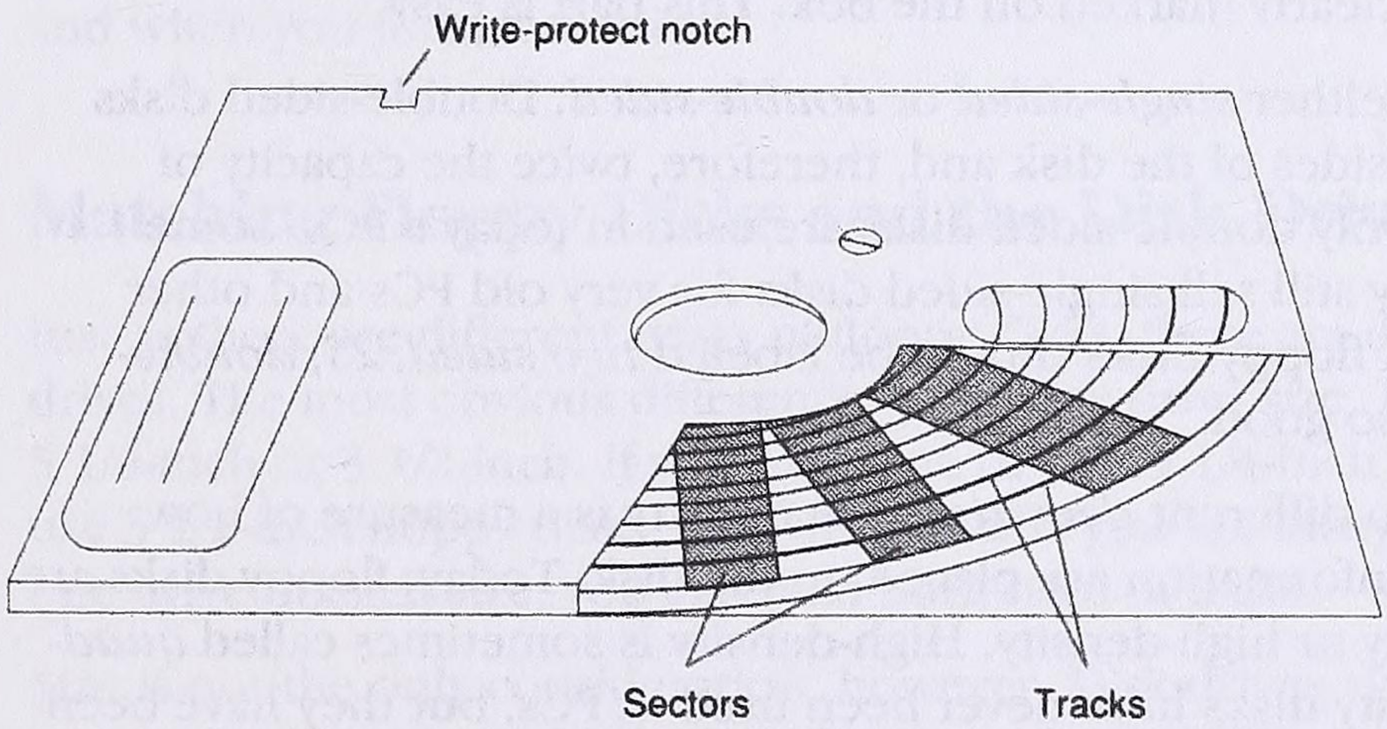
DOS's FORMAT command performs the preparation process for disks. You simply enter the command, and FORMAT analyzes for disk defects, generates a root directory, sets up a storage table (called a *file allocation table*), and alters other parts of the disk.

The magnetic disk is like unlined paper—hardly a good medium for proper magnetic penmanship. Although blank pages are fine for writing casual notes, you could wind up with wandering, uneven script. Lines on the paper serve as guides to help keep you on track. Although you can write on unlined paper, DOS is not that flexible. Your computer cannot use a disk at all until it is formatted.



Formatted disks can be compared to lined paper, with horizontal lines subdivided by vertical lines.

As lines on paper are guides for the writer, tracks and sectors on a disk are guides for the computer. Because the storage medium of a spinning disk is circular, the "premarked lines," or magnetic divisions called *tracks*, are placed in concentric circles. These tracks are further subdivided into areas called *sectors*.



When you format a blank disk, DOS magnetically *encodes*—or marks—tracks and sectors onto the disk surface. DOS decides what type of drive you have, and then positions the tracks and sectors accordingly. DOS stores data in these sectors and uses both the track and sector numbers to find and retrieve information.

Understanding Different Floppy Disks

With the different types of disks available, it is important that you understand what types of floppy disks are available so that you buy the right disks for your computer.

Unfortunately, there are many different ways of describing the different types of disks. If you walk into a computer store to buy 1.44 megabyte disks, you will find that the boxes of disks tell you everything but the capacity. With the following information, you will understand how to buy the different types of disks you might need.

Different types and sizes of floppy disks have different numbers of tracks, sectors, and capacities. Over the years, the maximum capacity of floppy disks has increased steadily. In 1981, a floppy disk could hold 160K (kilobytes). Today, the maximum capacity is 1.44M (megabytes), and 2.88M floppy disks are starting to appear.

Two sizes of floppy disks are used: 5 1/4-inch and 3 1/2-inch. The larger disks were available first and are still more common. The smaller disks have a higher capacity, have rigid cases that protect the disk from damage, and are more reliable. The size of the disks is easy to determine from the size of the box, and the size is clearly marked on the box. This part is easy.

Floppy disks can be either *single-sided* or *double-sided*. Double-sided disks have tracks on both sides of the disk and, therefore, twice the capacity of single-sided disks. Only double-sided disks are used in today's PCs. Some computer stores may still sell single-sided disks for very old PCs and other computers. Boxes of floppy disks should be labeled *two sided*, *2S*, *double-sided,* or *DS.* So far so good.

Floppy disks come in different *densities*. The density is a measure of how closely the bytes of information are placed on the disk. Today, floppy disks are either double-density or high-density. High-density is sometimes called *quad-density*. Single-density disks have never been used in PCs, but they have been used in older types of computers. Double-density disks usually are labeled *DD* or *2DD* (the *2* means double-sided). High-density disks usually are labeled *HD* or *2HD*.

Sectors on all types of disks hold 512 bytes (.5K). Disks have different capacities because they have more sectors per track or more tracks per side.

The standard floppy disks generally used are summarized in the following list:

Disk Type	*Sectors per Track*	*Tracks per Side*	*Capacity*
5 1/4-inch			
Double density	9	40	360 K
High density	15	80	1.2 M
3 1/2-inch			
Double density	9	80	720 K
High density	18	80	1.44 M

720K disks are often labeled *1M* and 1.44M disks are often labeled *2M*. These numbers refer to the unformatted capacity of the disk, and add to the confusion.

Should you remember all this information about floppy disks? No; the computer and DOS take care of most of this for you. You should understand, however, that there are different types of disks available when you buy disks and when you format them.

Matching Floppy Disks and the Disk Drive

Just as there are different types of floppy disks, there are different types of disk drives. The most obvious difference is the disk drive size. Drives can be either 5 1/4-inch or 3 1/2-inch. If you have one or two 5 1/4-inch drives, you cannot use 3 1/2-inch floppy disks, and vice versa. If you are lucky enough to have one drive of each size, you can read both sizes of disks.

Size is not the only consideration, however. Disk drives also have a maximum capacity. A 5 1/4-inch drive might be a standard (360K) drive or a high-capacity (1.2M) drive. A 1.2M drive can read and write 360K disks, but a 360K drive cannot read or write 1.2M disks. The 1.2M floppy disks fit in the drive, but you can't use them.

Although you can use 360K floppy disks in 1.2M drives, the results can be unreliable at times. If you write to a 360K disk in a 1.2M drive, you should have no trouble reading that disk in the same drive. You may, however, have trouble reading the disk in a 360K drive. This problem is intermittent and occurs more often with older drives. Keep this in mind if you copy files onto a floppy disk to be read by another computer. If you run into this problem, try using another floppy disk or format the disk again.

The same situation exists with 3 1/2-inch drives. If you have a 720K drive, you cannot use 1.44M disks. If you have 1.44M drives, you can use both types of 3 1/2-inch floppy disks.

Formatting Floppy Disks

As formatting your disks becomes a routine task, remember to use care. Formatting clears all information that a disk contains. If you format a disk you have used earlier, everything stored on that disk disappears. Be careful not to format disks that contain files you want to keep. Labeling your disks helps you avoid such a mishap. Another precaution is to write-protect disks that hold important information. You write-protect a disk by adding tape tabs on 5 1/4-inch disks or setting the write-protect switch on 3 1/2-inch disks.

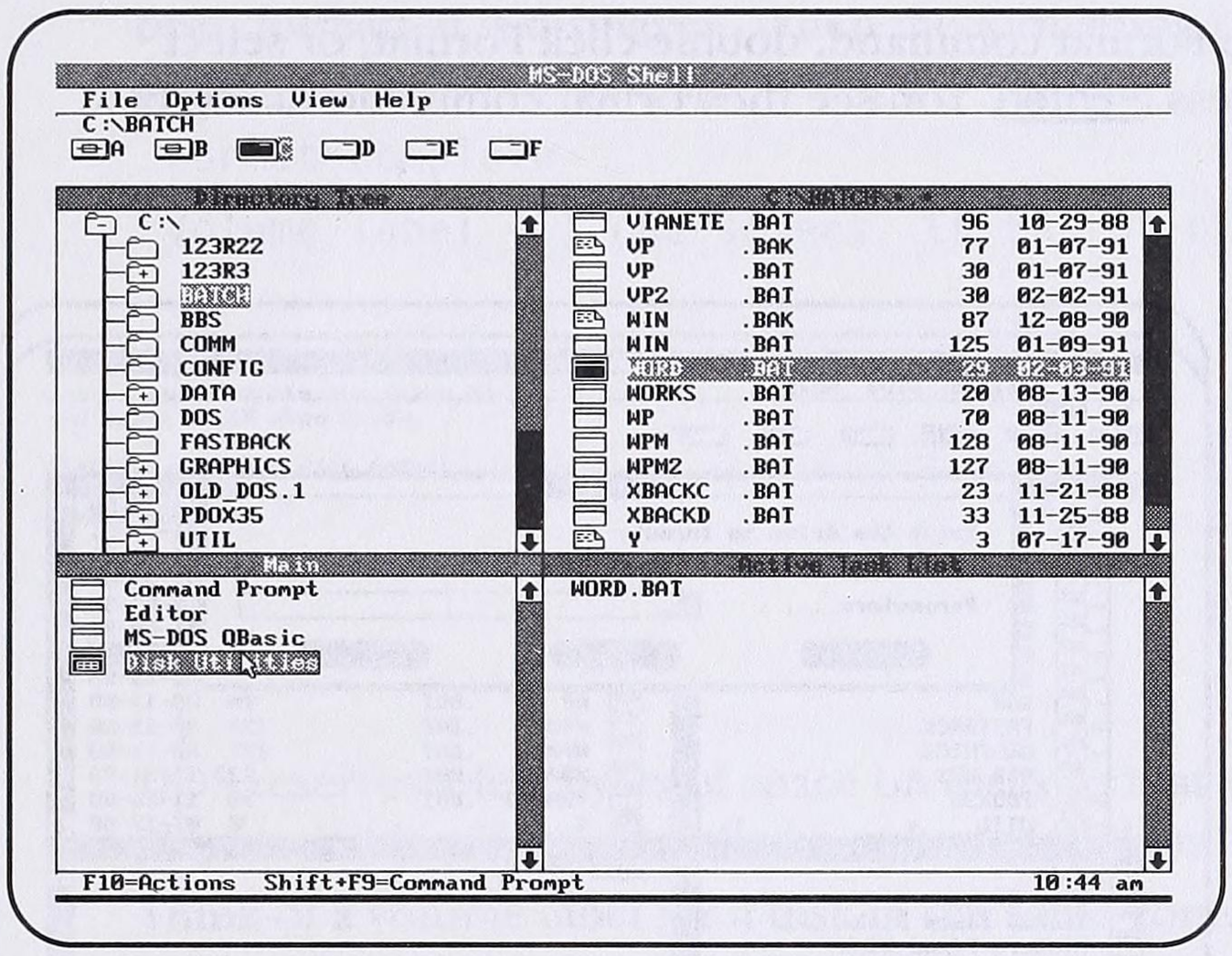
In any case, you should check the list of files on a disk before you try to format a used floppy. Checking the files on a disk is like reviewing what you have written on a blackboard before erasing it.

Before you begin, you should have a floppy disk ready to format. To avoid mistaking formatted disks for unformatted disks, place some indicator on each disk you format. The indicator may be as simple as a dot, a check mark, or the letter *F* for *formatted*. When you buy floppy disks, adhesive labels are included. A simple method to keep track of formatted disks is to put a label on each disk that you format. Then you know that a disk without a label has never been formatted.

If you have two floppy drives, you can format disks in either drive A or B. When you use the Shell, the default drive is A.

The default Program area at the bottom half of the Shell is labeled `Main`. This label refers to the Main *program group* that DOS sets up when you installed DOS on your hard disk. Program groups are like file folders that contain related programs. Program groups are discussed in Chapter 9.

The program groups are listed in the program area along with the programs in the Main group. DOS sets up the Main and Disk Utilities program groups automatically.

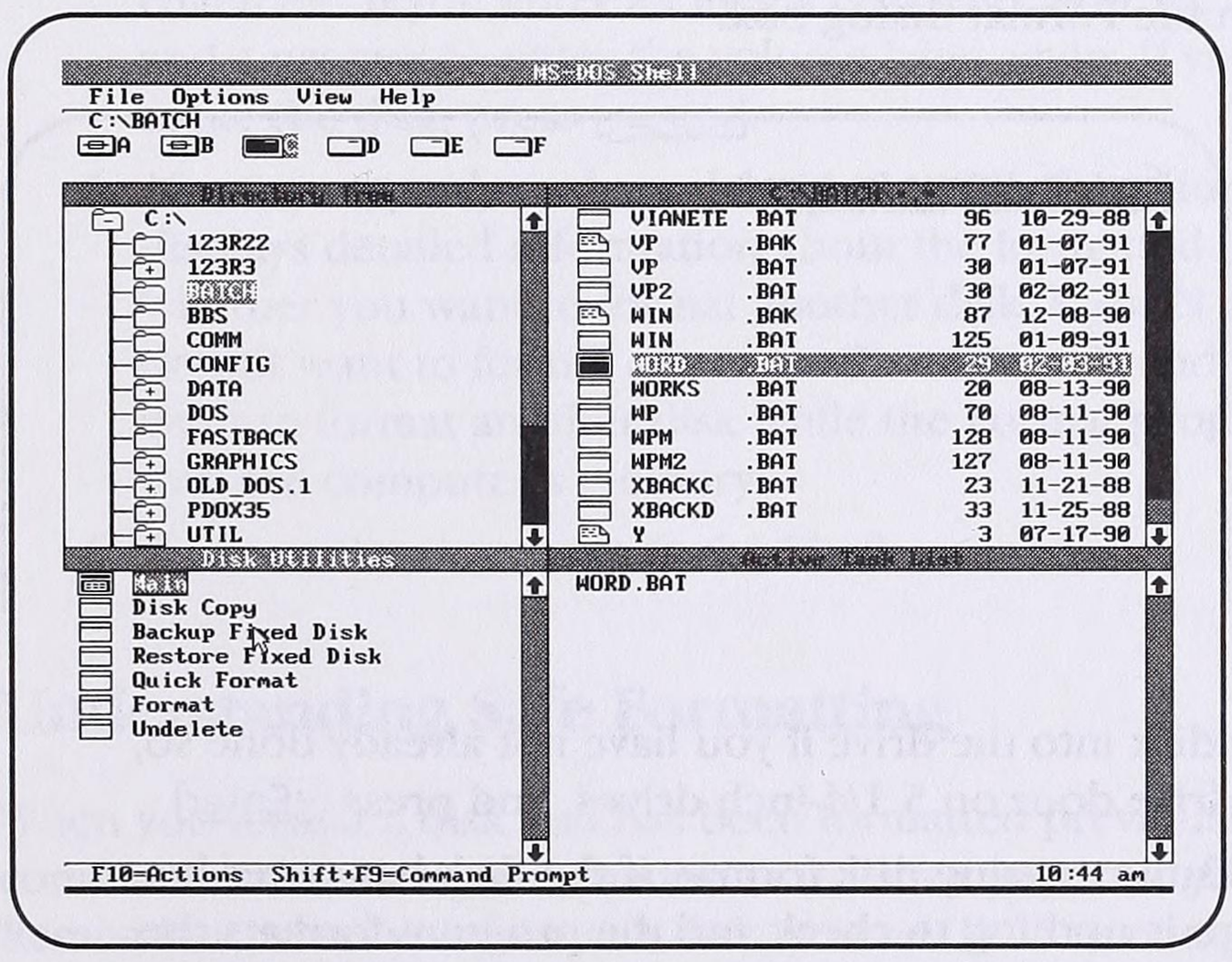


You can tell that Disk Utilities is a group and not a program because the icon is different.

To execute a program from the Shell, first you open the program group, and then you select the program in that group.

To format a floppy disk using the Shell, follow these steps:

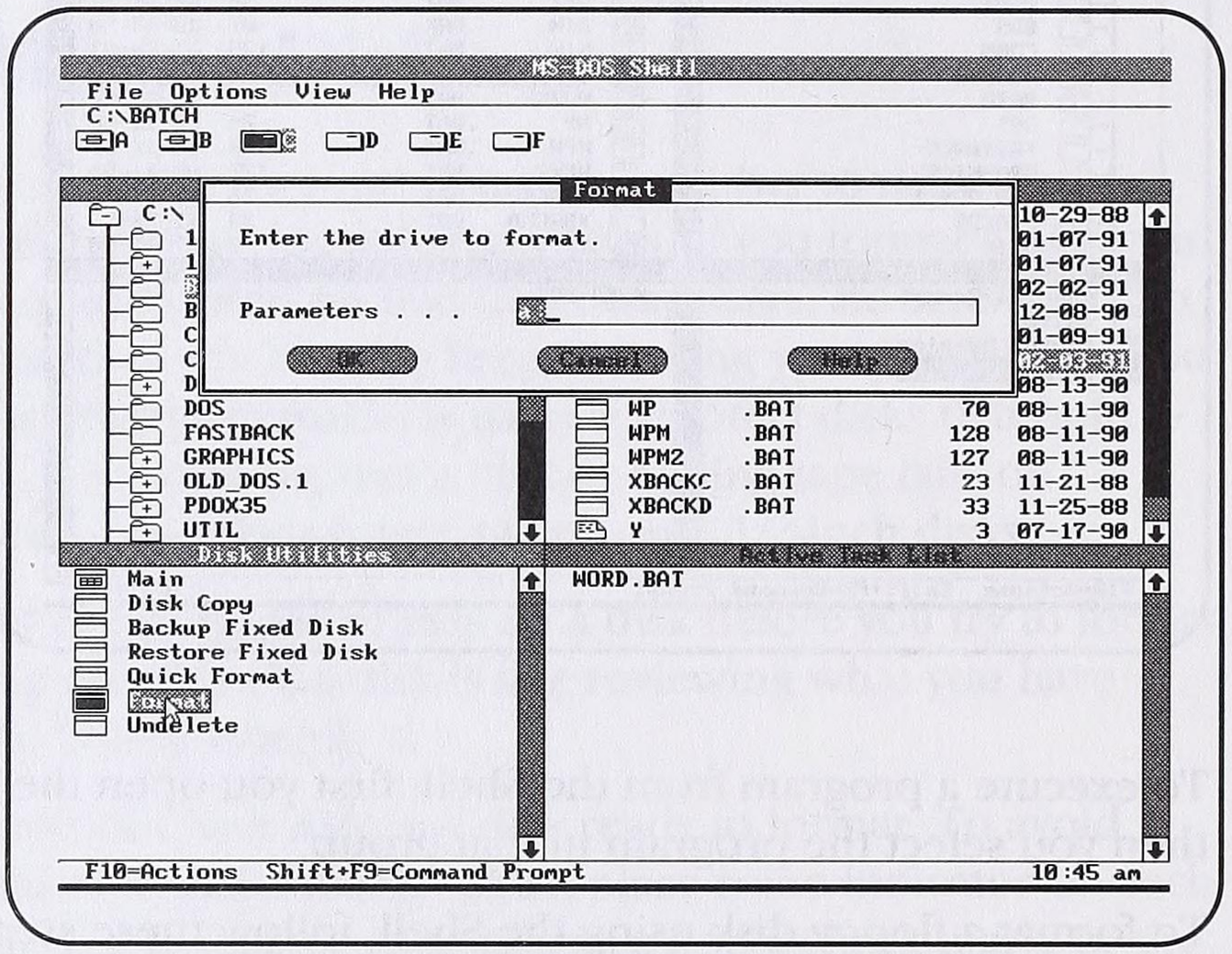
1. To open the Disk Utilities group, double-click on it, or select it and press ↵Enter.



The Disk Utilities program group contains DOS commands that help you manage disks. Most of these commands are covered in Chapters 7 and 10.

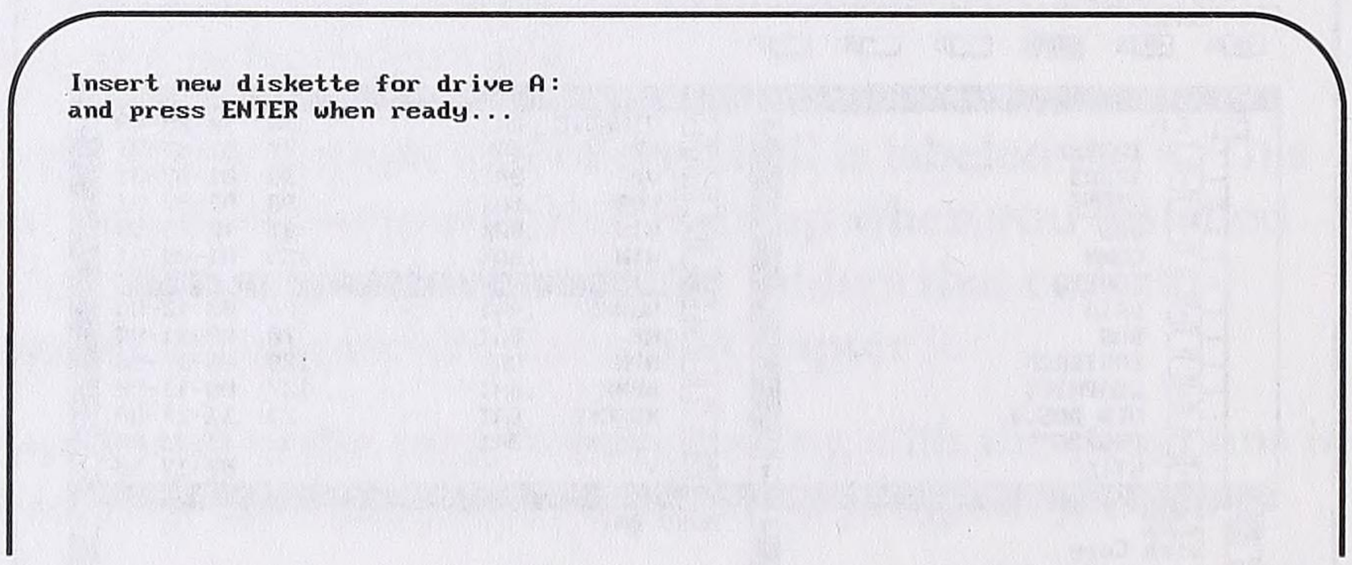
2. To execute the Format command, double-click Format, or select Format and press ↵Enter. You see the Format command dialog box.

DOS assumes that you want to format a disk in drive A. If you want to format the floppy disk with no special options, you can accept the default and select OK. To format a floppy disk in drive B, ignore the `a:` and type **b:**. When you type anything in the text box, the highlighted default text disappears.



3. Select OK from the Format dialog box.

Even if you have already put a floppy disk in the drive before you started the format, DOS prompts you to insert a disk into the drive.



4. Insert a floppy disk into the drive if you have not already done so, close the disk drive door on 5 1/4-inch drives, and press ↵Enter.

   FORMAT checks the existing disk format. If the disk has never been formatted, there is nothing to check and the program formats the disk. As the disk is formatted, the percentage of the disk that has

been formatted is displayed. When the formatting process is complete, you see the following message:

```
Format complete
Volume label (11 characters, ENTER for none)?
```

```
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Formatting 360K
Format complete

Volume label (11 characters, ENTER for none)?
```

Type of disk formatted.

DOS reserves a few bytes of space on disks so that you can place an electronic identification, called a *volume label*, on each disk.

Think of a volume label for a disk in the same context as the title of a book. When you assign a volume label, you can use the following characters, in any order:

- Letters A to Z and a to z
- Numerals 0 to 9
- Special characters and punctuation symbols:

  ~ ! @ # $ ^ & ( ) - _ { } '

If you try to enter too many characters, you hear a beep after the 11th character. If you enter an illegal character, you see an error message and a prompt to enter the volume label again. If you do not want to name the disk, press ↵Enter.

5. After you type the volume label or press ↵Enter for no label, DOS displays detailed information about the formatted disk, and then asks whether you want to format another disk. Press **N** and ↵Enter if you do not want to format any more disks. Press **Y** and ↵Enter if you want to format another disk while the Format program is still loaded into the computer's memory.
6. Press any key to return to the Shell.

Understanding Safe Formatting

When you format a disk that has been formatted previously, the Format command saves some information that allows you to *unformat* the disk. Remember, when you format a disk, you tell DOS to completely clear the disk

so that you can use it again. DOS saves the information that was on the disk; however if you format a floppy disk in error and you do not put any other files on the disk, you can unformat the disk and recover these files. This process is called *safe formatting*.

When a disk has been formatted before, DOS saves the information on the disk so that you can unformat the disk and recover the data.

```
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Saving UNFORMAT information
Verifying 360K
Format complete

Volume label (11 characters, ENTER for none)?
```


You learn about unformatting in Chapter 10.

In some cases, such as when a disk is completely full, DOS cannot save the unformat information and warns you that the disk cannot be unformatted. You can proceed with the format with no hope of recovering the data, or you can cancel the format command.

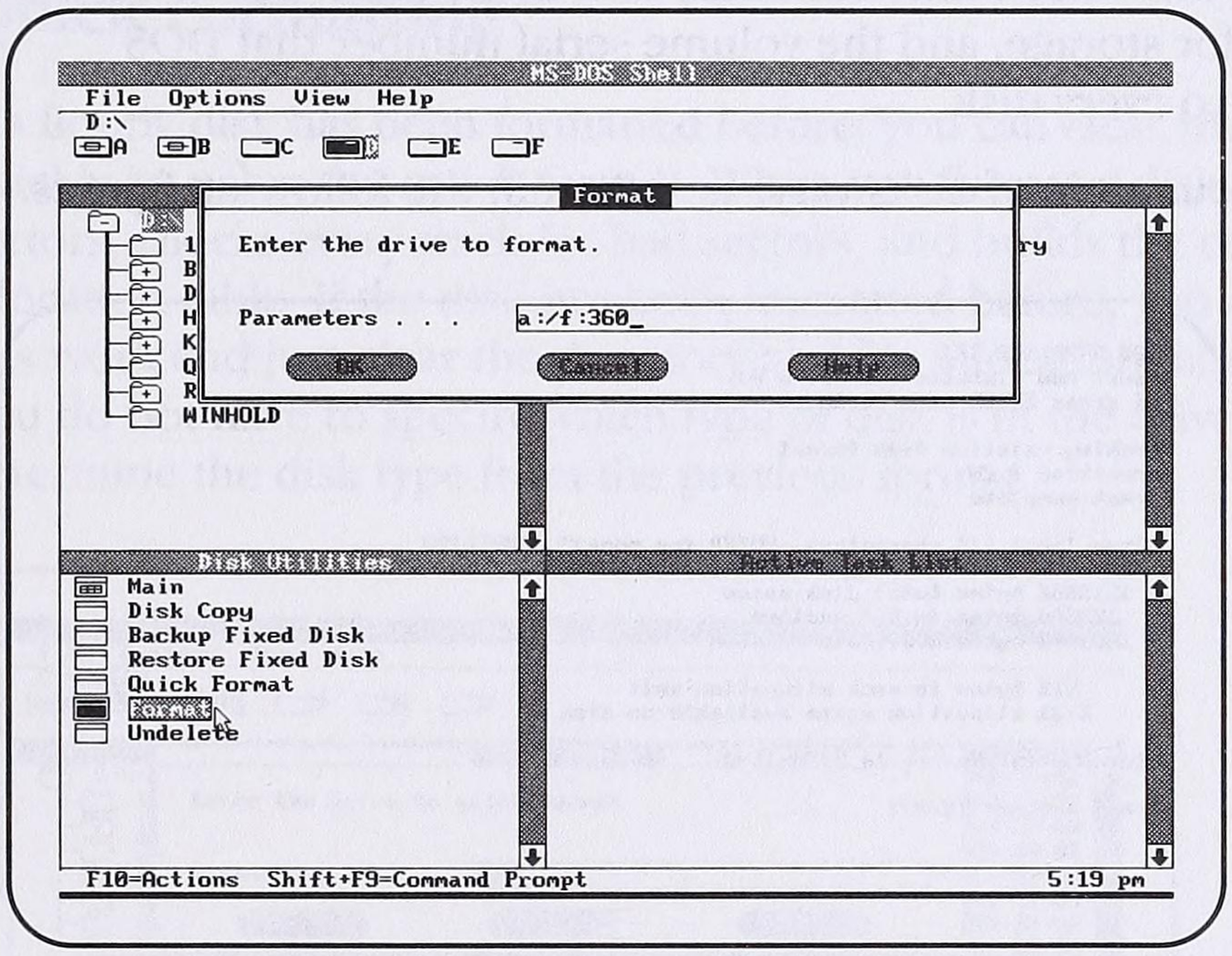
```
Insert new diskette for drive B:
and press ENTER when ready...

Checking existing disk format
Saving UNFORMAT information

Drive B error. Insufficient space for MIRROR image file.
There was an error creating the format recovery file
This disk cannot be unformatted
Proceed with Format (Y/N)?
```

Formatting Different Types of Disks

At times, DOS may not know what type of disk you want to format. If you have a 5 1/4-inch, 360K drive or a 3 1/2-inch, 720K drive, you have no problems. These drives can only use one type of disk, so DOS always knows what type of disk is in the drive.

High-capacity disk drives can format more than one type of disk. If you have a 1.2M drive, you can use either 360K or 1.2M floppy disks. If you have a 1.44M drive, you can use either 720K or 1.44M floppy disks. In some cases, you must specify the disk type in the Format dialog box. The default type of disk is always the highest-capacity disk that can work in the drive.

When you format a new disk in a 1.2M drive, DOS assumes that it is a 1.2M disk, unless you tell it otherwise. So if you want to format a 1.2M disk in a 1.2M drive, you do not have to do anything special. If, however, you want to format a 360K disk in a 1.2M drive, you must tell DOS the disk type. You specify the drive type in the Parameters text box in the Format dialog box.



The information in the Parameters text box says to format a 360K disk in drive A. The /F: parameter is known as a size switch; it specifies the capacity of the disk, not its size.

Before you type the size parameter, you must clear the highlight in the text box. If you begin typing, the `a:` parameter disappears. To add a parameter, first press the End key or click the mouse cursor at the end of the parameter. This action cancels the highlight and anything you type is added to the end of the text box.

To specify the size, first type a slash (/). DOS then knows that a command switch follows. A *switch* is special information that gives instructions to a command. The size switch is /F: followed by the capacity of the disk. In this case you would type **/f:360**.

To format a 720K disk in a 1.44M drive, use the switch **/f:720**. To format a disk in drive B, do not press End to clear the highlight, just type **b:**, followed by the switch.

You can use upper- or lowercase letters when you enter information in a dialog box. For example, the drive letter can be b or B.

Looking at the FORMAT Command's Output

After the format is complete and you type a volume label and press ↵Enter, you see a report of the status of the disk. The report shows the total disk space and total bytes available on the disk. If FORMAT detects *bad sectors*—bad spots—on the disk, it marks them as unusable. FORMAT also reports how many bytes are unavailable because of bad sectors. Other information includes how many bytes each *allocation unit* contains, how many allocation units are available on the disk for storage, and the volume serial number that DOS automatically assigns to every disk.

The numbers for various sizes of disks vary, as shown in the following figures.

This report shows disk information for a 1.2M disk with bad sectors.

```
TYPE SAMPL120.TXT
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Formatting 1.2M
Format complete

Volume label (11 characters, ENTER for none)? SAMPLE12M

   1213952 bytes total disk space
    122880 bytes in bad sectors
   1091072 bytes available on disk

       512 bytes in each allocation unit
      2131 allocation units available on disk

Volume Serial Number is 2720-1500

Format another (Y/N)?
```

This report shows disk information for a 720K disk.

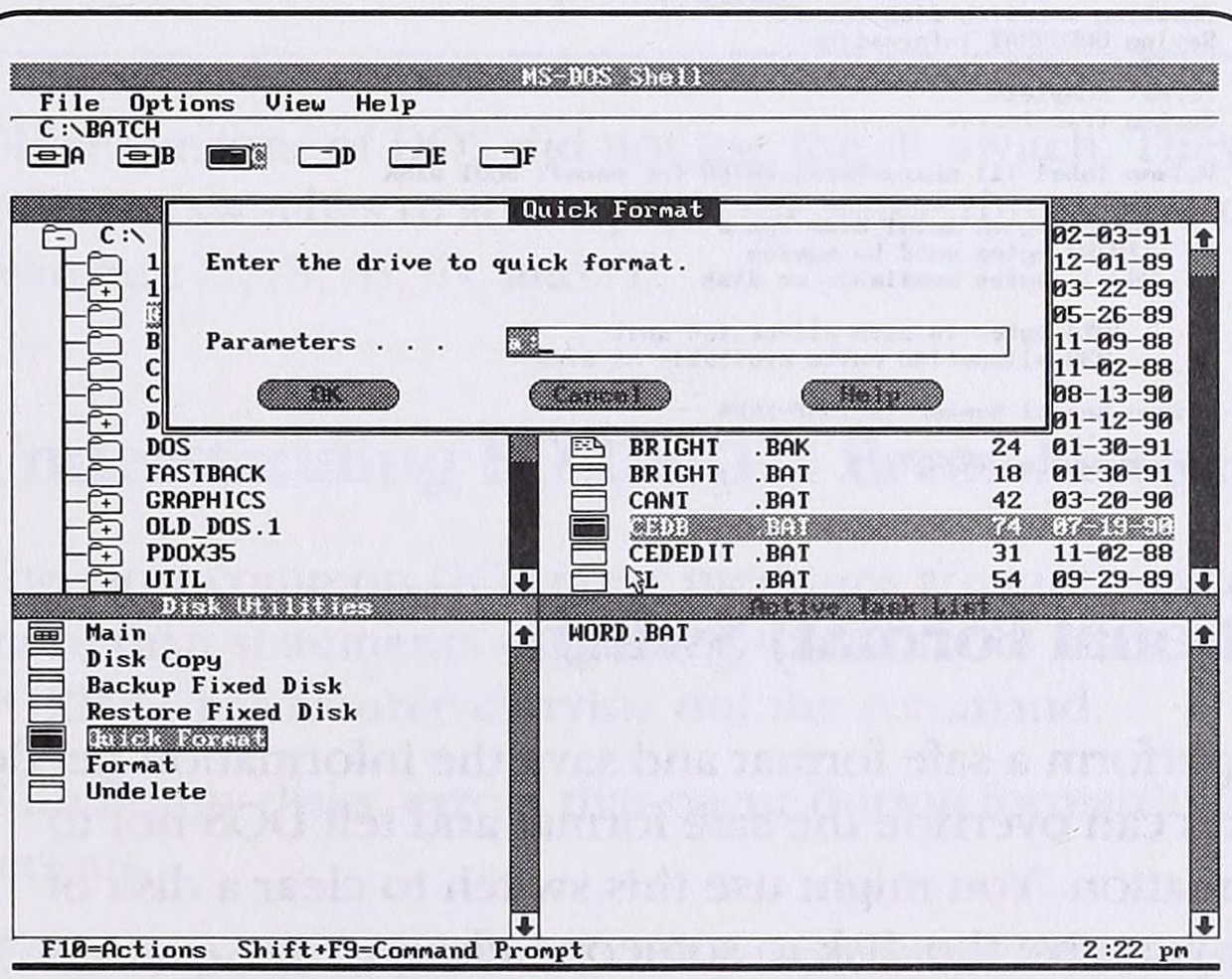
```
TYPE SAMPL120.TXT
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Formatting 1.2M
Format complete

Volume label (11 characters, ENTER for none)? SAMPLE12M

   1213952 bytes total disk space
    122880 bytes in bad sectors
   1091072 bytes available on disk

       512 bytes in each allocation unit
      2131 allocation units available on disk

Volume Serial Number is 2720-1500

Format another (Y/N)?
```

```
Insert new diskette for drive B:
and press ENTER when ready...

Checking existing disk format
Saving UNFORMAT information
Verifying 1.44M
Format complete

Volume label (11 characters, ENTER for none)? SAMPLE 144M

   1457664 bytes total disk space
   1457664 bytes available on disk

       512 bytes in each allocation unit
      2847 allocation units available on disk

Volume Serial Number is 3358-15DC

Format another (Y/N)?
```

This report shows disk information for a 1.44M disk.

Quick Formatting

If a floppy disk has been formatted before, you can clear the entire disk quickly by using the *quick format*. When you format a disk, DOS lays out the sectors, checks every track for bad sectors, and builds the directory and file allocation table. If the disk has been formatted before, you can skip most of this work and just clear the directory and file allocation table in a few seconds. You do not have to specify which type of disk is in the drive because DOS can determine the disk type from the previous format.



To perform a quick format, choose Quick Format from the Disk Utilities program group. The format proceeds just like a regular format except that it only takes a few seconds.

Learning FORMAT's Other Switch Options

You can add switches to modify the FORMAT command. You can add more than one switch if you separate each one with a slash. The switches **A:/F:360/S** are valid parameters in the Format dialog box, as explained in the following sections.

The /S (Transfer System Files) Switch

The /S switch places the DOS system files on the formatted disk. Use this switch if you want to be able to boot your PC with the disk that you are formatting. You cannot see these hidden files in the disk directory disk, but the files are there, along with COMMAND.COM.

Always keep at least one floppy disk handy with the system files in case you have trouble booting from your hard disk. You can then boot from the floppy disk to get to the hard disk and fix the problem.

The report for a 360K disk formatted with system files.

```
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Saving UNFORMAT information
Verifying 360K
Format complete
System transferred

Volume label (11 characters, ENTER for none)? BOOT DISK

    362496 bytes total disk space
    118784 bytes used by system
    243712 bytes available on disk

      1024 bytes in each allocation unit
       238 allocation units available on disk

Volume Serial Number is 135F-15F4

Format another (Y/N)?
```

The /U (Unconditional Format) Switch

Normally, DOS tries to perform a safe format and save the information needed to unformat the disk. You can override the safe format and tell DOS not to save the unformat information. You might use this switch to clear a disk of confidential data before you give the disk to someone else.

Other Size Switch Options

There are several other /F size switch options that enable you to format disks for early-model computers or for computers that use the first versions of DOS, as follows:

Parameter	*Disk*
/F:160	Single-sided disk with DOS 1.*x*
/F:180	Single-sided disk
/F:320	Double-sided disk with DOS 1.*x*

You can specify the current default disk types as well. There is no reason to do this now, but if you get a 2.88M drive or a future higher capacity 5 1/4-inch drive, you may need these parameters:

Parameter	*Disk*
/F:1.2	1.2M disk
/F:1.44	1.44M disk

Older versions of DOS did not use the /F: switch. They used a variety of different switches to accomplish the same thing. You can ignore the following switches: /1, /8, /B, /N, and /T.

Understanding FORMAT's Error Messages

The most common DOS error messages are rarely catastrophes. They are little more than statements suggesting that you did something wrong or that FORMAT has trouble carrying out the command.

With floppy disks, errors that occur during formatting activity are usually not serious.

If you respond to the `Press any key when ready` **prompt without placing a disk in the disk drive, or if the door is open, DOS displays the message:**

```
Not ready
Format another (Y/N)?
```

Just insert the disk, close the door if necessary, press **Y** **and** Enter **for the format to start. If you specified the wrong disk drive, press** **N** **and** Enter**. Then execute the command again with the correct drive letter.**

This message means that DOS cannot read from the disk drive. For floppy drives, the drive door may be open, or the disk may not be inserted.

```
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Not ready
Format another (Y/N)?
```

Another kind of error involves a write-protection problem. If the disk is write protected, you get the same message as if there was no disk in the drive. So if you get this error and the disk is in the drive, take the disk out and check the write-protect tab.

To format a write-protected disk, remove the write-protection from a 5 1/4-inch disk or slide the tab on a 3 1/2-inch disk, reinsert the disk, and press **Y** at the prompt.

If the FORMAT command detects unusable areas on the disk, you see a line describing the problem in the report.

```
TYPE SAMPL120.TXT
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Formatting 1.2M
Format complete

Volume label (11 characters, ENTER for none)? SAMPLE12M

    1213952 bytes total disk space
     122880 bytes in bad sectors
    1091072 bytes available on disk

        512 bytes in each allocation unit
       2131 allocation units available on disk

Volume Serial Number is 2720-1500

Format another (Y/N)?
```

Although not a true error message, a bad-sectors report points out a possible problem with the disk.

The `Bytes in bad sectors` message means that MS-DOS found bad sectors on the disk. These sectors cannot be used to hold information. The total amount of free space on the disk is reduced by the number of bytes in the bad sectors.

Try reformatting the disk. If it still has bad sectors, and it is a new disk, you can have your dealer replace the disk, or you can use the disk as is. Before you do either, though, try formatting the disk again.

If you get a very large number of bad sectors, you may have tried to format a 360K disk as a 1.2M disk. DOS will try to format the disk, but after grinding and chugging, you end up with mostly bad sectors. Format the disk again with the /F:360 switch.

If you reformat a disk that is completely full, there is no room to save the information to allow the disk to be unformatted. You see a warning message that the disk cannot be unformatted.

The worst disk-error message that you can get is

```
Invalid media or Track 0 bad - disk unusable
```

```
Insert new diskette for drive B:
and press ENTER when ready...

Formatting 1.44M
Invalid media or Track 0 bad - disk unusable
Format terminated
Format another (Y/N)?
```

This disk may have a scratched surface; DOS couldn't read disk-level information on the first track.

You may receive this error message for two possible reasons. If you try to format a 720K disk as a 1.44M disk, you will get this message. Format the disk again with the /F:720 switch.

This message also can mean that the areas on the disk that hold important DOS system data are bad. If you get the `Disk unusable` error message on a new disk, take it back to your dealer. If the disk is old, throw it away. Disks are inexpensive and, in this case, should be discarded. Trying to use a bad disk is being penny wise and pound foolish.

Cautions about Formatting a Hard Disk

Hard disks are a desirable part of a computer system because of their speed and storage capacity. Just like floppy disks, they must be formatted before you use them. Unless you are familiar with the procedure, however, ***do not attempt to format your hard disk!***

Many computer dealers install the operating system on a computer's hard disk before you receive it. If your dealer has installed an applications program, such as a word processor, ***do not*** format the hard disk. If you reformat your hard disk, all programs and data will be erased.

Should you ever attempt to reformat your hard disk, first perform a complete backup. Make sure that you are familiar with the RESTORE command (see Chapter 10). You also should have a bootable floppy disk ready that contains a copy of RESTORE. The *MS-DOS 5 User's Guide*, Special Edition devotes several pages to preparing and formatting a hard disk. If you must format your hard disk, consult that book or your computer's manual.

Remember that FORMAT erases all the data a disk contains. Always check the directory of the disk you want to format. It may hold data you need. Make a mental note to check the command line thoroughly when you use the FORMAT command.

Lessons Learned

- There are different types of floppy disks and disk drives.
- You have to match the disks that you buy to the disk drive in your computer.
- Unformatted floppy disks can be compared to sheets of unlined paper.
- Formatting a disk is analogous to lining off your notepad before writing.
- You can give your disks electronic labels.
- You can quick format a disk that was previously formatted in a few seconds.
- You can format a floppy disk to include the DOS system files and use this disk to boot your computer.
- Error messages can be helpful. Most of them do not indicate impending catastrophe.
- Hard disks demand special treatment and care when the FORMAT command is used.

In the next chapter, you learn the most important DOS commands to manage your data.

7

Maintaining Files

Until the invention of the printing press, one of the most prestigious occupations was that of a scribe. In cloistered solitude, the scribe devoted his life to copying books by hand. This effort saved many texts from oblivion because of neglect during the Dark Ages.

Almost certainly, scribes made mistakes, but they compensated for them by profusely illustrating each assigned book with gold leaf. Art has frequently been employed to hide cracks in walls. In this case, art played down the number of misplaced words and bad translations.

You have become a modern-day scribe, with editing and copying speeds measured in milliseconds, rather than years. Your tools are the microcomputer, your fingers, and a few DOS commands.

Making the perfect copy

Copying from file to file

Moving files

Deleting files

Renaming files

Duplicating a disk

Verifying while duplicating

In this chapter, you learn how to copy the contents of one disk to another disk and compare them for accuracy, copy single or groups of files between disks, copy files with the same or different file names, erase or rename files in groups, and use the COPY command to enhance disk organization.

Key Terms Used in This Chapter

Point-and-shoot	To use a mouse to select files and copy or move the files visually by *dragging* the mouse pointer to the destination.
Drag	To move the mouse pointer while holding down the left mouse button.
Source	The disk or file from which you are copying or moving.
Destination	The disk or file to which you are copying or moving.
Target	Same as destination.
Current directory	The directory that DOS uses as the default directory. The current directory is highlighted in the Directory Tree area in the DOS Shell.
Overwrite	Writing new information over old in a disk file.

Files and Labels

Disk files are the primary storage place for data and programs. A knowledge of how to manage these files is essential. If you want to be in control of your work, you must be in control of your files. This chapter tells you how to copy disks, copy and move files, erase unneeded files, and rename existing files.

When you work with floppy disks, always keep the labels on your disks current. Use a felt-tipped pen and indicate the contents on the disk label as you work. Disks not labeled or labeled incorrectly are an invitation to lost data. If you do not label disks, you might mistake them for blank, unformatted disks.

Never use a ball point pen to write on a label that has been placed on a floppy disk. The jacket doesn't keep the pen point from possibly damaging the magnetic media and harming the disk.

Copying and Moving Files with the Shell

Copying and moving are probably two of the most frequently used tasks in the DOS Shell and should be fully understood. Besides viewing directories of files, Copy, Move, Rename, Delete, and their shortcut equivalents, are powerful commands that can give you a feeling of complete control.

You should not, however, use Copy, Move, Rename, or Delete if your mind is occupied with matters unrelated to your PC. Take a nap, watch TV, or drink coffee first. These commands are DOS power tools and should be used by only those who are alert and careful.

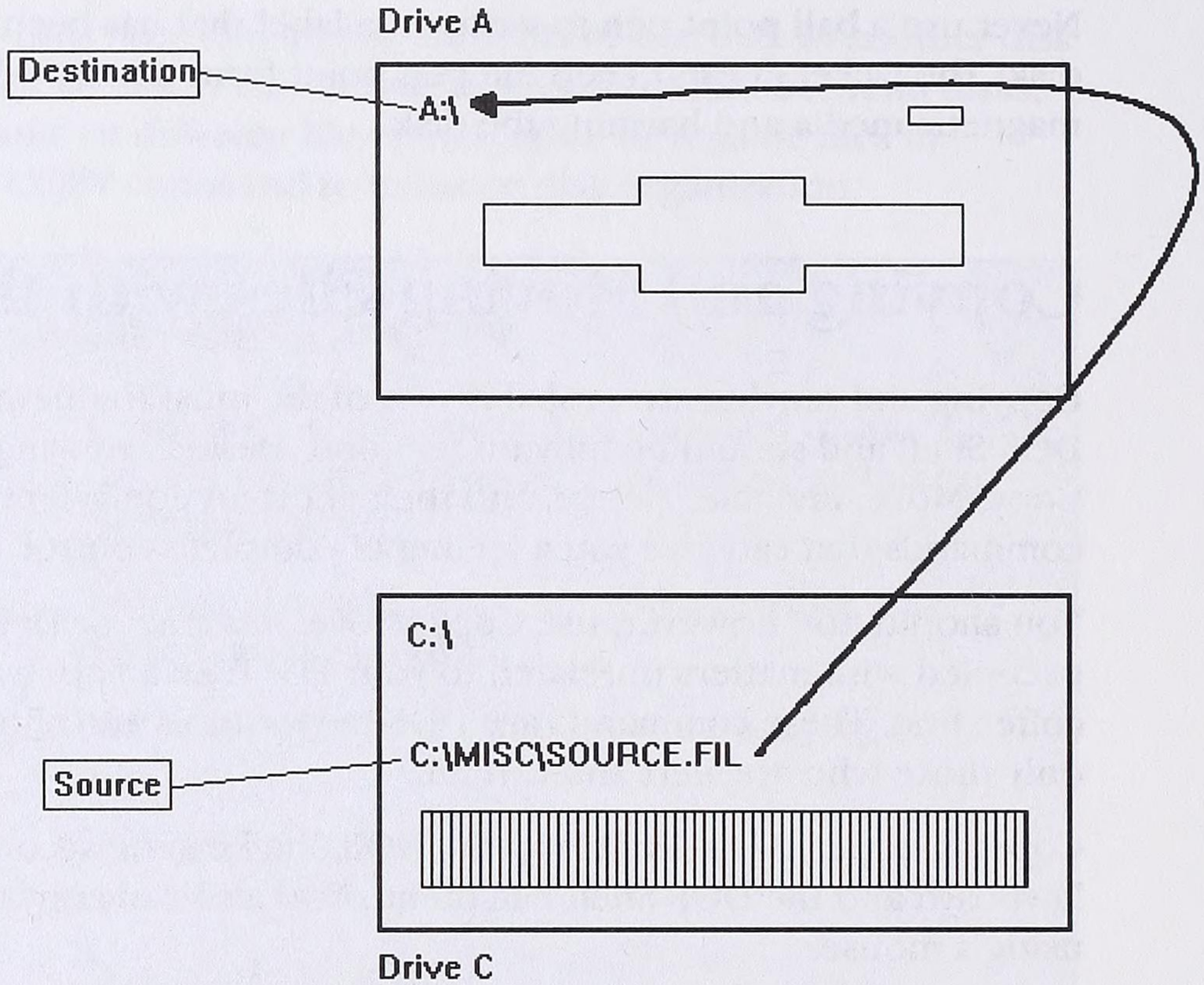
Copying and moving files using the DOS Shell can be accomplished using the keyboard and the DOS Shell File menu. You also can copy and move files using a mouse.

Using a mouse greatly simplifies copying and moving files. A mouse gives you a point-and-shoot method of copying and moving files. When you use the point-and-shoot method, you select the files, and then hold the mouse button down and drag the mouse pointer to the destination disk or directory. You do not need to type commands or use menus.

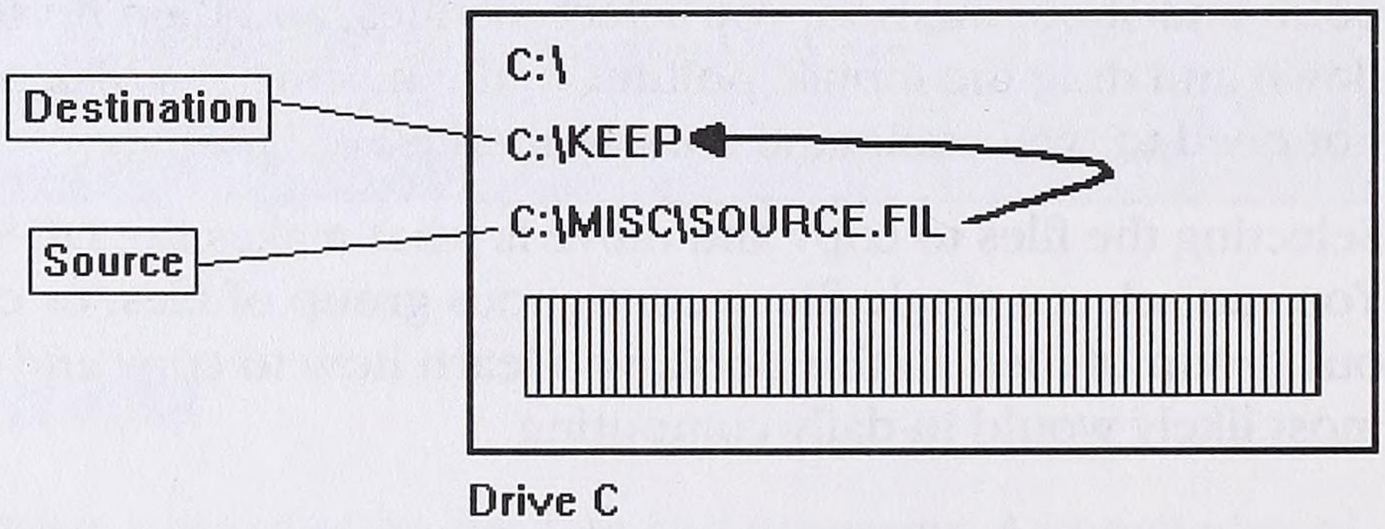
Selecting the files to copy and move is what makes the DOS Shell nice to use. You can select a single file, a contiguous group of files, or even a noncontiguous group of files. In this book, you learn how to copy and move files as you most likely would in daily computing.

Understanding the Principles of Copy and Move

Copying or moving a file or group of files is a relatively straightforward process. You have a source file that you select to copy or move, and you have a destination where the file will finally reside. The destination can be a different disk than the source or a different directory in the same disk.



The destination can be another disk.



The destination can be another directory on the same disk.

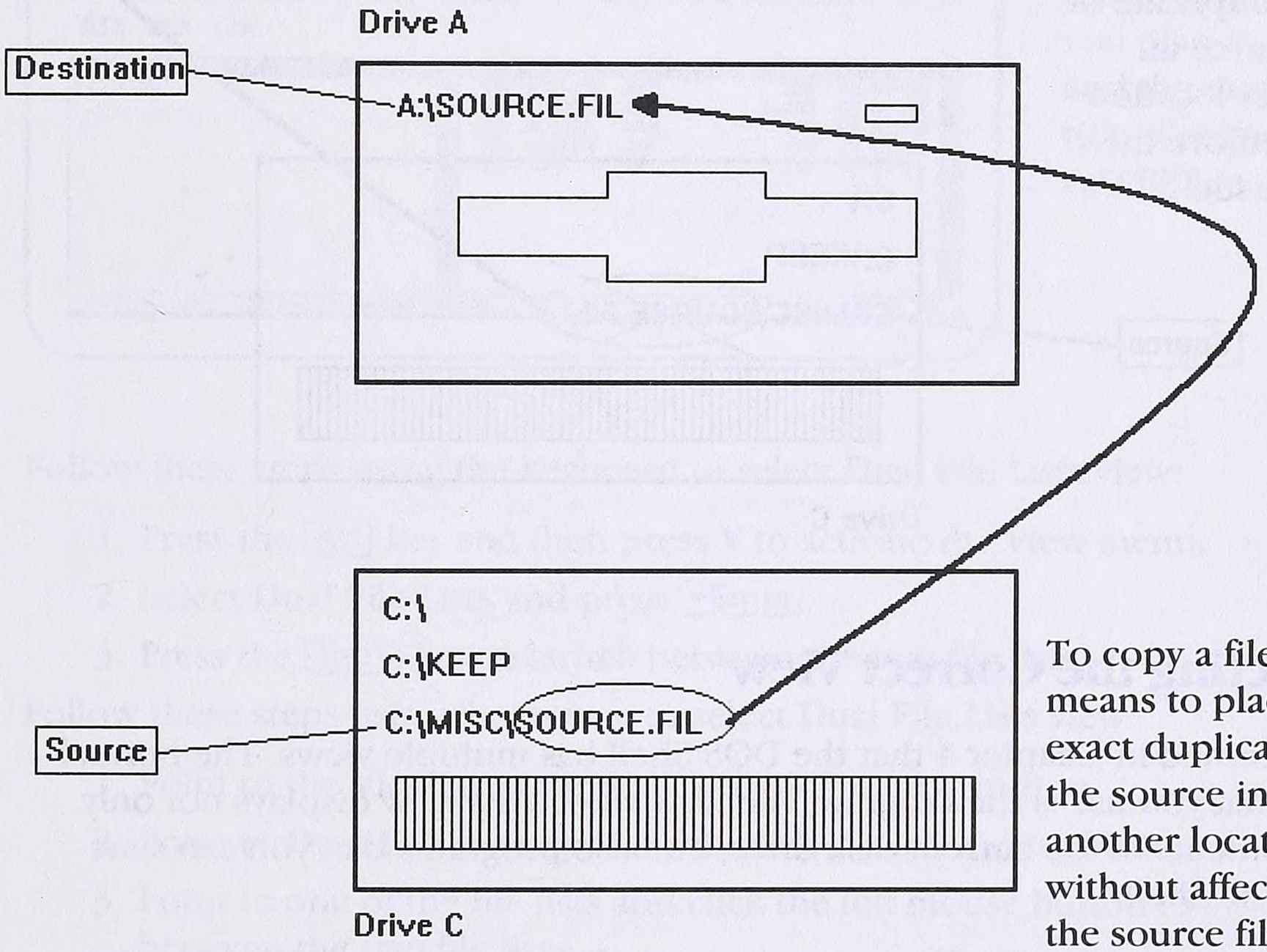
Selecting to copy or move a file gives different results. Copying a file is like having one picture on the west wall of your office, liking the picture so much that you have it duplicated, and placing it on the east wall in your office. Duplicating the picture gives you two identical pictures, each in a different place.

Copying a file is similar. While the source file is in one location, an exact duplicate of the file now resides in a second location. If you copy the file more than once, the file can reside in many locations.

You should avoid having multiple copies of the same files in many locations without a reason. If you have copies of a data file in multiple directories on

your hard disk, you can update one copy and leave several out-of-date copies on the disk. Because they all have the same name, you easily could update the wrong copy.

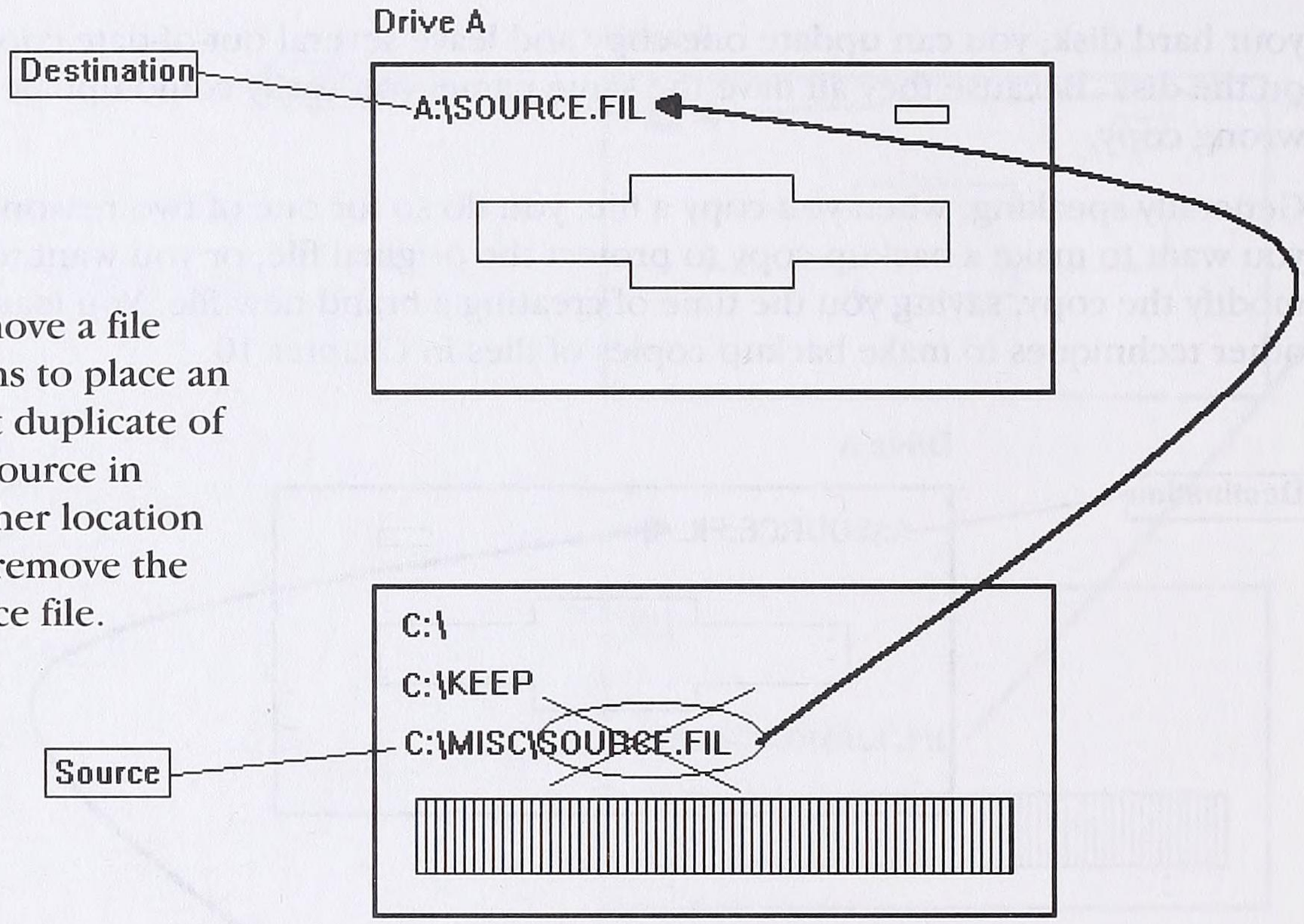
Generally speaking, when you copy a file, you do so for one of two reasons: you want to make a backup copy to protect the original file, or you want to modify the copy, saving you the time of creating a brand new file. You learn other techniques to make backup copies of files in Chapter 10.



To copy a file means to place an exact duplicate of the source in another location without affecting the source file.

Suppose that you have that same picture on your west wall. You get tired of seeing it there, so you remove it from the west wall and place it on the east wall. The picture is the same picture, but it simply resides in a different location now that you moved it.

Periodically, you will decide that a file no longer belongs on a certain disk or in a certain directory. So you will want to place a copy of the source file at a new destination, and remove the source file. You may want to move a file for two reasons: you have restructured your hard disk and the file no longer belongs in the directory it is in, or you no longer use a file, so you decide to move it to a floppy disk for storage.



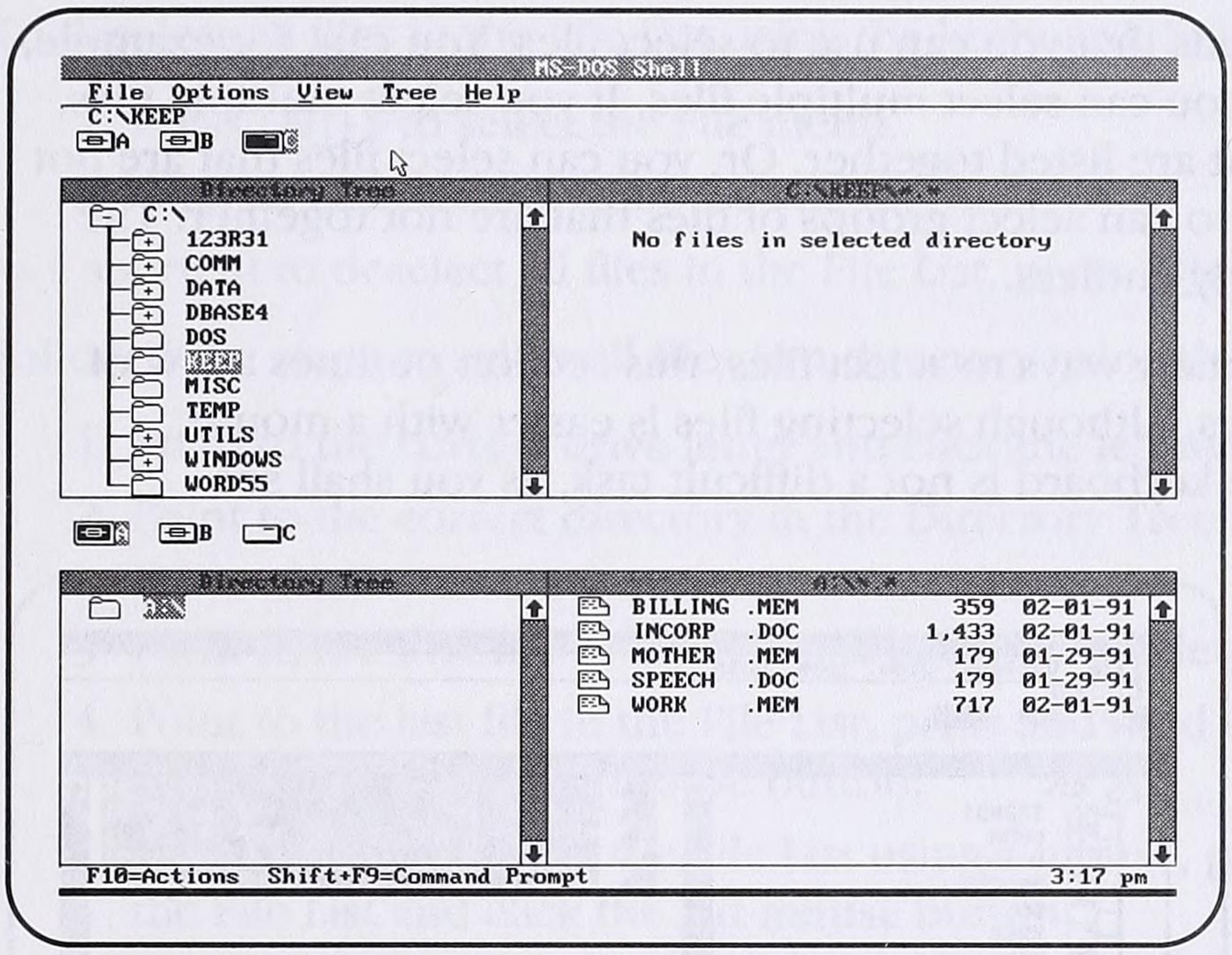
To move a file means to place an exact duplicate of the source in another location and remove the source file.

Selecting the Correct View

You learned in Chapter 4 that the DOS Shell has multiple views. The normal view that you use is the Program/File Lists view. This view displays not only the contents of the current disk drive, but also programs that you can start from the Shell.

For copying or moving files using the same disk, the Program/File Lists view is just fine. You can display the files that you need to copy or move, and the directory tree of the drive, enabling you to determine the source and destination of the copy or move.

Suppose that you are copying files from one disk to another. The capability to view the contents of both disks is quite helpful. Selecting the Dual File Lists view enables you to view the contents of both disks, enabling you to ensure the correct source and destination.



The Dual File Lists view enables you to see both the source files on drive A: that you plan to copy and the destination directory, C:\KEEP.

Follow these steps using the keyboard to select Dual File Lists view:

1. Press the Alt key and then press **V** to activate the View menu.
2. Select **D**ual File Lists and press ↵Enter.
3. Press the Tab ⇆ key to switch between the two file lists.

Follow these steps using the mouse to select Dual File Lists view:

1. Point to the **V**iew menu and click the left mouse button.
2. Point to **D**ual File Lists option and click the left mouse button.
3. Point to one of the file lists and click the left mouse button to switch between the two file lists.

You can switch among the different views following the preceding steps. Select the desired view instead of Dual File Lists, however.

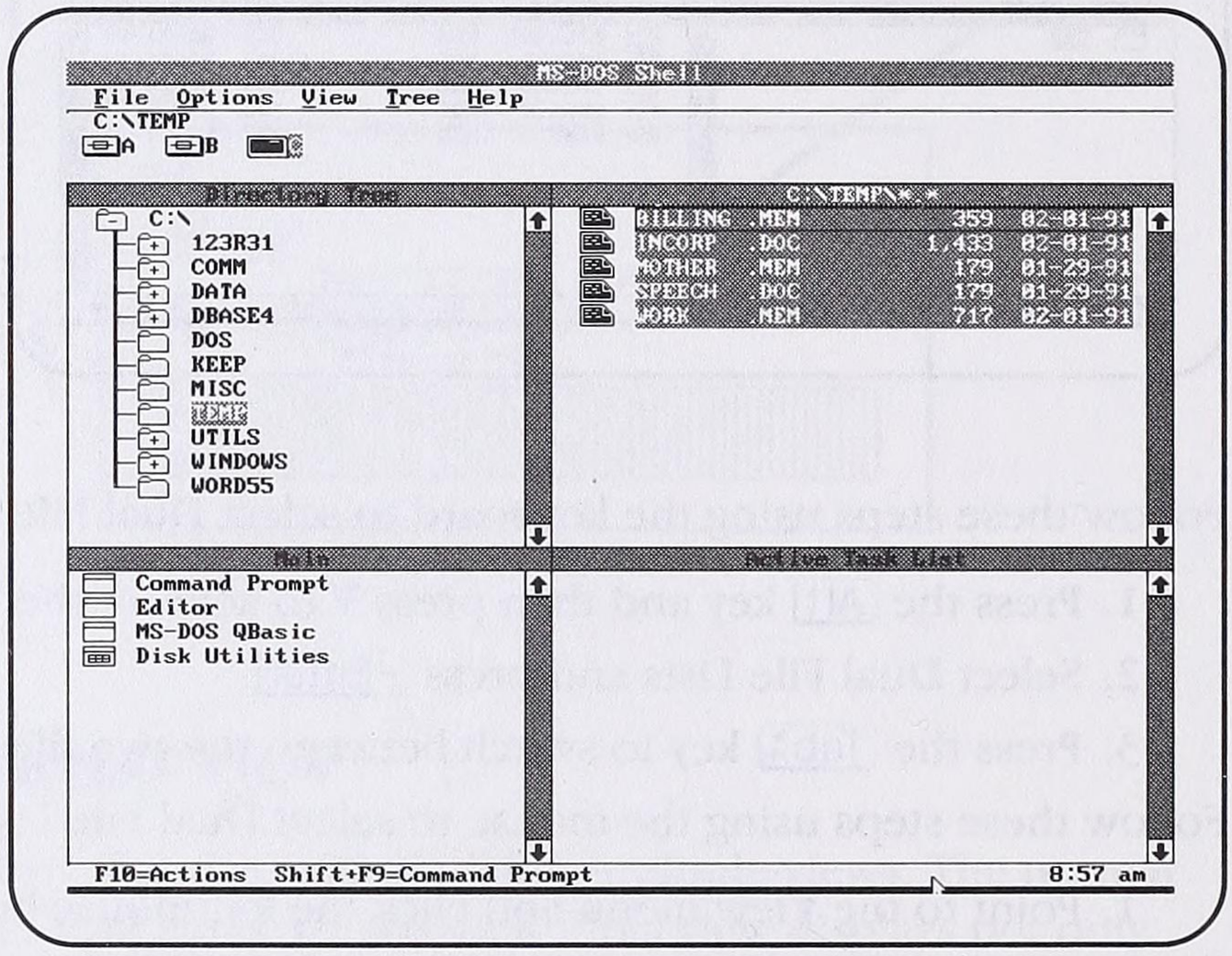
Selecting Source Files

Before you can copy or move a file or group of files, you must select these files. When you select a file, the file name is highlighted. When you execute a command, DOS performs the command on the selected files.

There are many methods that you can use to select files. You can, for example, select a single file, or you can select multiple files. If you select multiple files, you can select files that are listed together. Or, you can select files that are not listed together. You also can select groups of files that are not together. The combinations are nearly endless.

Because there are so many ways to select files, this section outlines a few of the most common ways. Although selecting files is easier with a mouse, selecting files with the keyboard is not a difficult task, as you shall see.

To manipulate all of the files in a directory, you first must select them all.



Follow these steps to select all files in a directory using the keyboard:

1. Press Ctrl and the drive letter to activate the correct drive. Press Ctrl-C, for example, to activate drive C:.
2. Using the Tab key, activate the Directory Tree.
3. Using the ↑ and ↓ keys, select the correct directory.
4. Press the Tab key to activate the File List.
5. Press Alt-F to select the File menu.
6. Choose Select All from the File menu.

As a shortcut to select all files in the File List, perform Steps 1 through 4, and then press Ctrl-/.

To deselect all files in the File List using the keyboard, follow these steps:

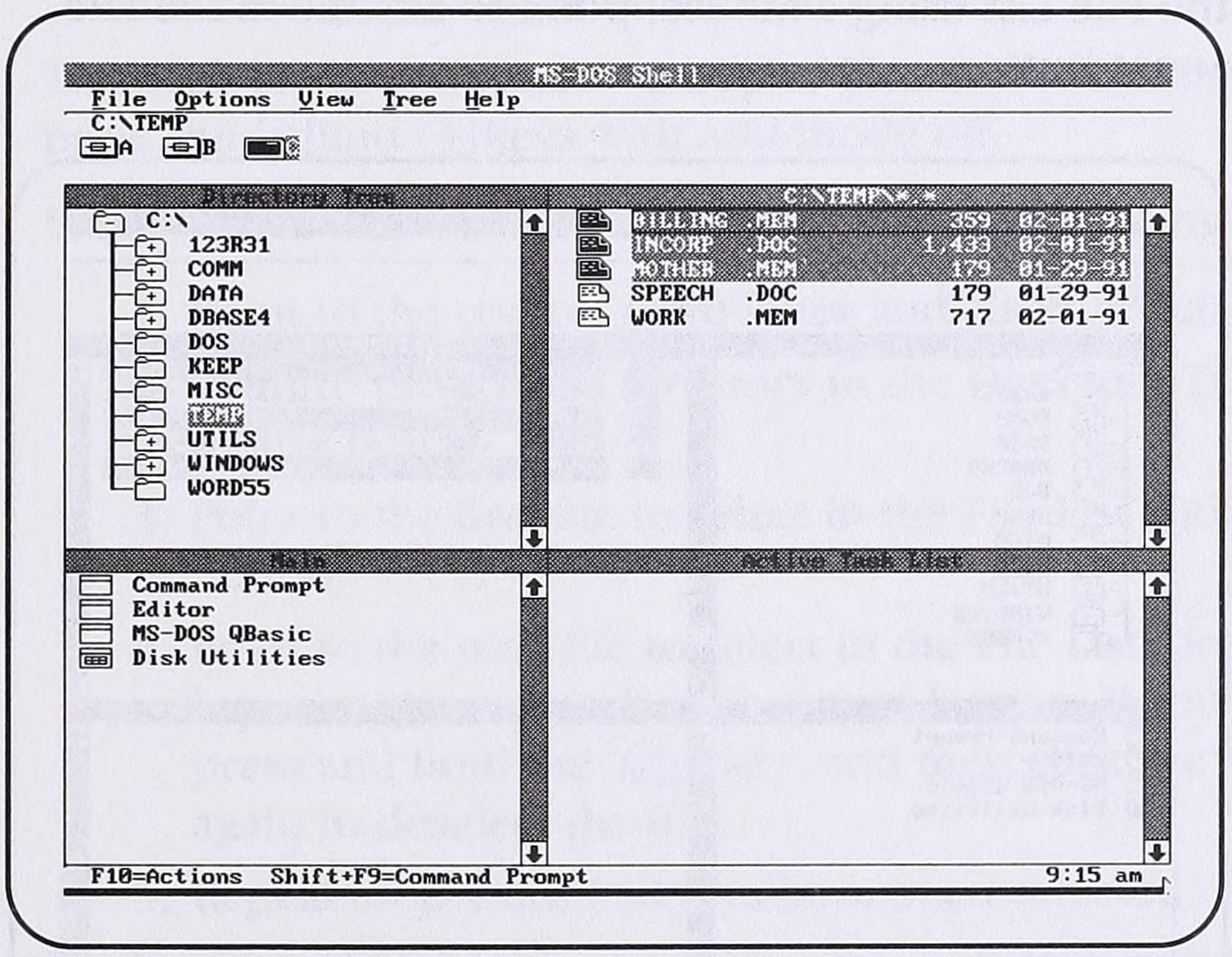
1. Press Alt-F to select the File menu.
2. Choose Deselect All from the File menu.

As a shortcut to deselect all files in the File List, press Ctrl-\.

Follow these steps to select all files in a directory using the mouse:

1. Point to the correct drive letter and click the left mouse button.
2. Point to the correct directory in the Directory Tree and click the left mouse button.
3. Point to the first file in the File List and click the left mouse button.
4. Point to the last file in the File List, press and hold the Shift key, and then click the left mouse button.

   To deselect all files in the File List using a mouse, point to any file in the File List and click the left mouse button.



You can easily select a contiguous group of files for processing.

Follow these steps to select a contiguous group of files in a File List using the keyboard:

1. Press Ctrl and the drive letter to activate the correct drive. Press Ctrl-C, for example, to activate drive C:.
2. Using the Tab key, activate the Directory Tree.
3. Using the ↑ and ↓ keys, select the correct directory.

4. Press the Tab key to activate the File List.
5. Using the ↑ and ↓ keys, select the first file in the group.
6. Press and hold the Shift key. Using the ↓ key, select to the last file in the group.

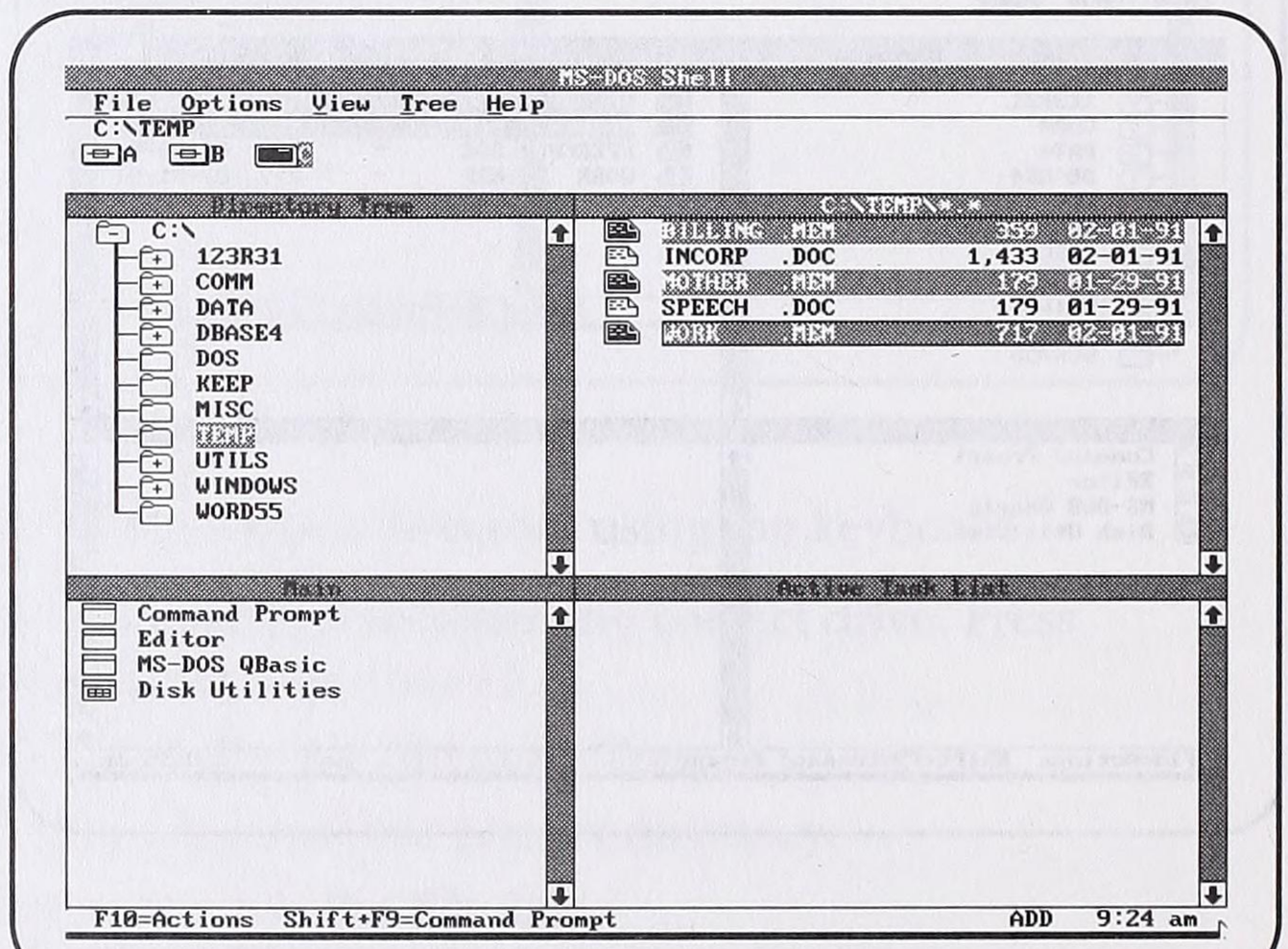
To deselect the contiguous group of files in the File List using the keyboard, press the ↑ and ↓ keys.

Follow these steps to select all files in a directory using the mouse:

1. Point to the correct drive letter and click the left mouse button.
2. Point to the correct directory in the Directory Tree and click the left mouse button.
3. Point to the first file in the File List of the group to select, and click the left mouse button.
4. Point to the last file in the File List of the group to select. Press and hold the Shift key, and then click the left mouse button.

To deselect all files in the File List using a mouse, point to any file in the File List and click the left mouse button.

Files that are non-contiguous can be selected for copying, moving, or deleting.



Follow these steps to select a noncontiguous group of files in a File List using the keyboard:

1. Press Ctrl and the drive letter to activate the correct drive. Press Ctrl-C, for example, to activate drive C:.
2. Using the Tab key, activate the Directory Tree.
3. Using the ↑ and ↓ keys, select the correct directory.
4. Press the Tab key to activate the File List.
5. Using the ↑ and ↓ keys, select the first file in the group.
6. Turn on Add mode by pressing Shift-F8. The word Add appears in the status line at the bottom of the display.
7. Press the ↓ key to move to the next file to select.
8. Press the **space bar** to select the file. If you select a file in error, press the **space bar** again to deselect the file.
9. Repeat Steps 7 and 8 until all files are selected.
10. Press Shift-F8 to turn off Add mode.

To deselect the contiguous group of files in the File List using the keyboard, press the ↑ and ↓ keys with Add mode off.

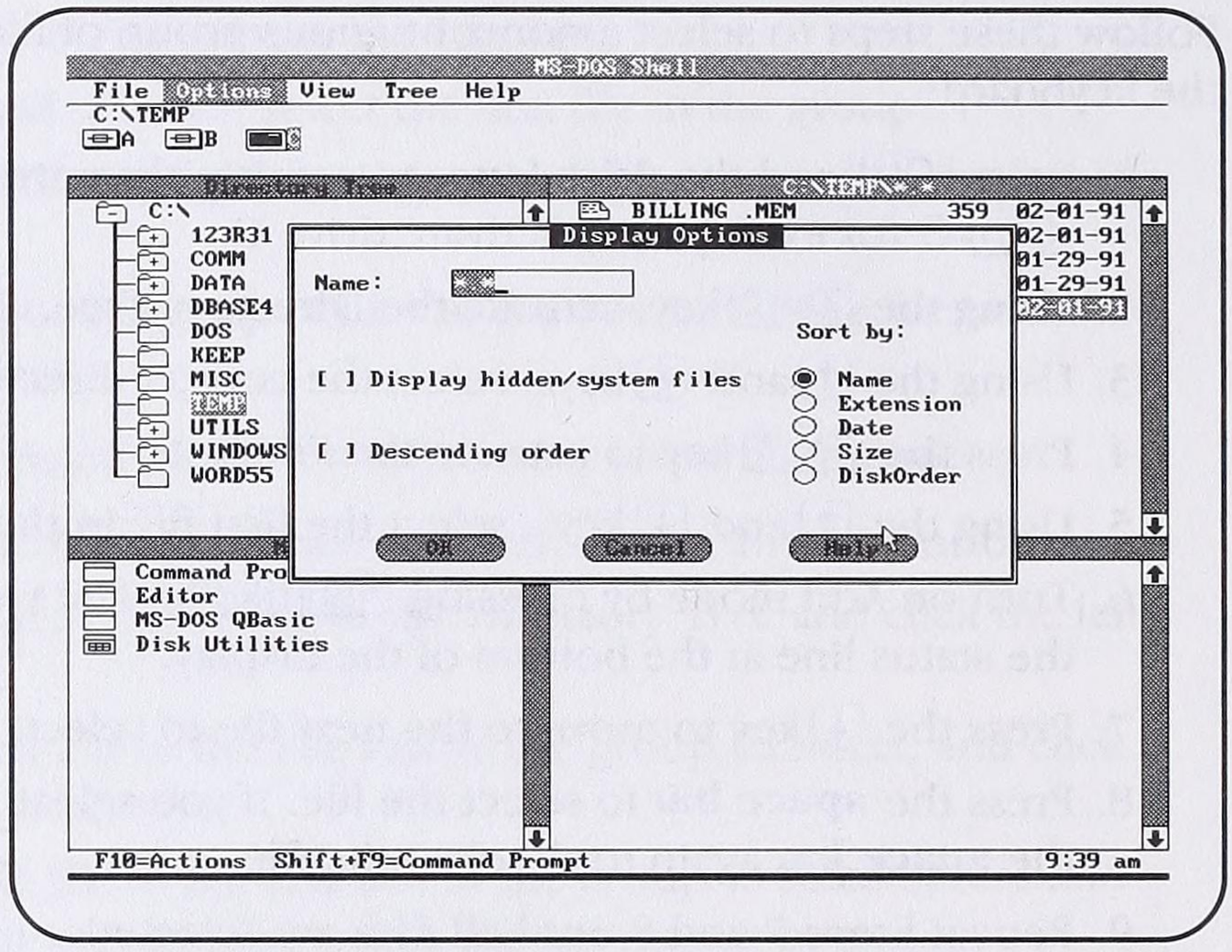
Follow these steps to select all files in a directory using the mouse:

1. Point to the correct drive letter and click the left mouse button.
2. Point to the correct directory in the Directory Tree and click the left mouse button.
3. Point to the first file to select in the File List and click the left mouse button.
4. Point to the next file to select in the File List, press and hold the Ctrl key, and then click the left mouse button. If you select a file in error, press and hold the Ctrl key, and then click the left mouse button again to deselect the file.
5. Repeat Step 4 until all files have been selected.

To deselect all files in the File List using a mouse, point to any file in the File List and click the left mouse button.

Using the steps outlined, you can select any combination of files. Selection, as you see, is easy. Sometimes you can make selecting multiple files easier by changing the order of the files in the File List. You can do so using File Display Options from the Options menu. If you want to copy the files that you created today to another disk, for example, you view the file list by date in descending order. All the files created today appear at the beginning of the list.

You can change the sort order of the files in the File List to make selection of files easier.



7

Copying Files between Disks

You can copy one file or many files from one disk to another. Although you normally copy files to another disk to preserve a copy of the file, copying also is useful when you need to transfer files from one computer to another.

Follow these steps using the keyboard to copy files from one disk to another (if you are copying to or from a floppy disk, be sure that the disk is in the correct drive):

1. Press Alt-V to open the View menu.
2. Select Dual File Lists.
3. Press Tab ↹ to activate the lower Directory Tree (the destination directory tree).
4. Press Ctrl and the drive letter to activate the destination drive. Press Ctrl-A, for example, to activate drive A:.
5. Press the Tab ↹ key to activate the destination directory tree and select the destination directory if the destination disk contains directories.
6. Using the Tab ↹ key, activate the upper Directory Tree (the source directory tree).
7. Press Ctrl and the drive letter to activate the source drive. Press Ctrl-C, for example, to activate drive C.

8. Press the Tab key to activate the source directory tree and use the ↑ and ↓ keys to select the correct directory.
9. Select the files to copy.
10. Press Alt-F to open the File menu
11. Choose Copy from the File menu.

    The Copy File dialog box appears on-screen. Two text boxes appear in the dialog box—one labeled From, containing the files you have selected; the other, labeled To, is for you to type the name of the disk to copy the files to.
12. In the To text box, type the drive name and directory to copy the files to, for example, A:\ and press ↵Enter.

You can use the shortcut key F8 rather than perform Steps 10 and 11.

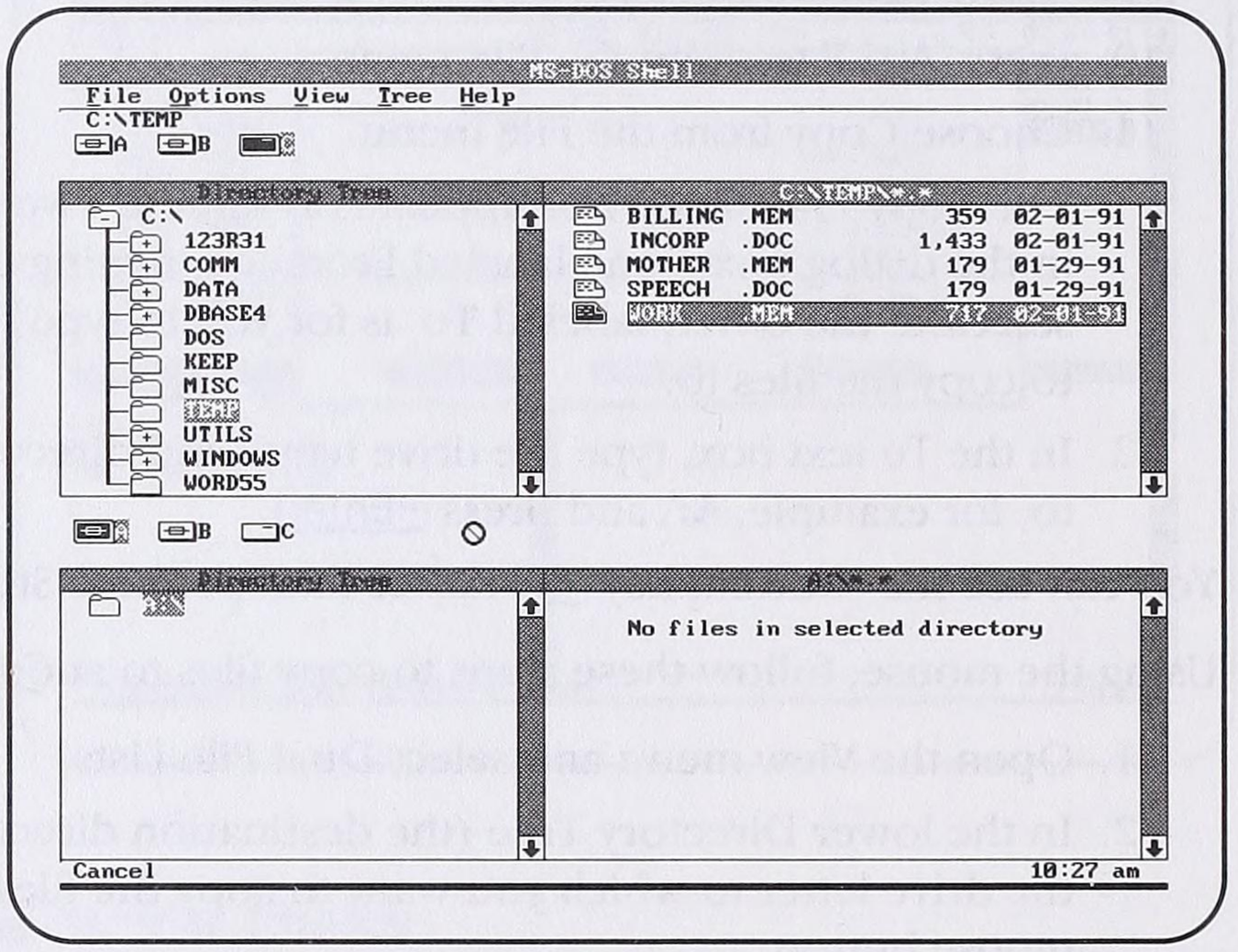
Using the mouse, follow these steps to copy files to another disk:

1. Open the View menu and select Dual File Lists.
2. In the lower Directory Tree (the destination directory tree), point to the drive letter to which you want to copy the files and click the left mouse button.
3. Select the destination directory if the destination disk contains directories.
4. In the upper Directory Tree (the source directory tree), point to the drive letter from which you are copying the files and click the left mouse button.
5. Point to the correct directory in the source Directory Tree and click the left mouse button.
6. Select the files to copy.
7. If you have selected multiple files, press and hold the Ctrl key. Point to one of the files selected, press and hold the left mouse button. You can then release the Ctrl key.
8. Drag the selected files to the destination directory tree.
9. Release the left mouse button to complete the copy.
10. If mouse confirmation is selected, the Confirm Mouse Operation dialog box appears. You must select Yes to complete the copy. This confirmation safeguards you in case you selected the wrong disk. If you did select the wrong disk, select No.

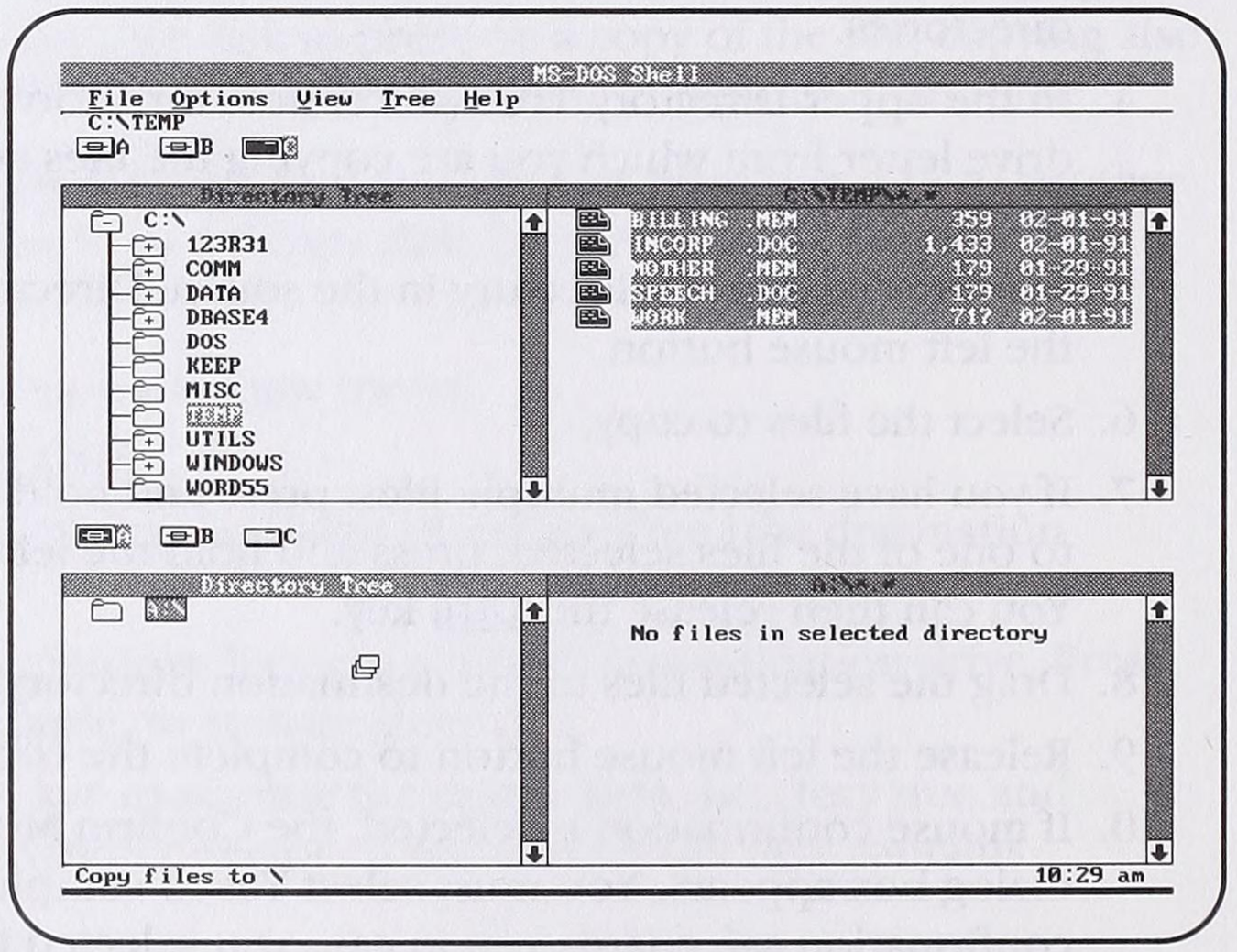
When you use the mouse to copy files, this is the point-and-shoot method of copying. This method is very accurate because you see the files you selected and you select by sight the drive to which you want to copy.

As you are dragging the files, the mouse pointer changes from an arrow to one of two pointers.

When the pointer looks like a circle with a line through it, you are pointing to an invalid area of the screen.



The pointer appears as three stacked boxes when you have dragged files to a valid area to copy the files.



Copying a File to the Same Disk Directory

One rule of DOS is that no two files in a single directory can have the same name. Why doesn't DOS allow this?

Think of a directory on a disk as a house on a block. Suppose that two people with the name Fred Smith live in the same house. When you want one of them you call, "Hey, Fred Smith!" Both of them come running to you. To avoid confusion, you might call one Freddy Smith and the other Fred Smith.

The same dilemma faces DOS. You cannot have two files named MEMO1229.DOC, for example, in the same directory. You can have, however, one file named MEMO1229.DOC and another named MEMO1229.TXT. Although the root name is the same, MEMO1229, the file extensions are different—DOC and TXT.

Perhaps you have just created a file called EXPJAN91.WK1 containing your expenses for January. Now, it is time to begin creating a file with your expenses for February. Suppose that your expenses for each month are quite similar. Rather than create a brand new file, you copy the file EXPJAN91.WK1, calling the new file EXPFEB91.WK1. You then can edit EXPFEB91.WK1 for the correct February expenses.

When you copy a file to the same directory, you must give it a different name. When you use the Shell, you can only copy one file to the same directory at a time.

Follow these steps using the keyboard to copy a file to the same directory (if you are copying using a floppy disk, be sure that the disk is in the correct drive):

1. Press Ctrl and the drive letter to activate the correct drive. Press Ctrl-C, for example, to activate drive C:.
2. Using the Tab key, activate the upper Directory Tree.
3. Using the ↑ and ↓ keys, select the correct directory.
4. Select one file to copy.
5. Press Alt-F to select the File menu
6. Choose Copy from the File menu.

   The Copy File dialog box appears on-screen. Two text boxes appear in the dialog box—one labeled `From`, containing the file that you have selected; the other, labeled `To`, is the destination file.
7. In the `To` text box, type the new file name and press ↵Enter.

   The new file appears in the file list.

You can use the shortcut key F8 rather than perform Steps 5 and 6.

Using the mouse, follow these steps to copy files to the same directory:

1. Point to the correct drive letter you want to activate and click the left mouse button.
2. Point to the correct directory in the Directory Tree and click the left mouse button.
3. Select the file to copy.
4. Click the File menu.
5. Click Copy in the File menu.

   The Copy File dialog box appears on-screen. Two text boxes appear in the dialog box—one labeled `From`, containing the file that you have selected; the other, labeled `To`, is for the destination file.
6. In the `To` text box, type the new file name and click OK with the mouse.

   The new file will appear in the file list.

Copying Files Across Directories

Copying a file or a group of files from one directory to another on a disk is just like copying a file or a group of files from one disk to another. The only difference is that the destination is another directory on the same disk instead of another disk.

Even though the source and destination are on the same disk, you do not have to worry about file names being the same. Remember the dilemma that occurred when two people named Fred Smith lived in the same house? When you called for Fred Smith, both came running. Suppose that Fred Smith #1 moved to the house next door. Now there is no confusion. When you want Fred Smith #1, you go to his house. To get Fred Smith #2, you go to his house.

Different directories on a disk is similar to different houses on the same block. Although each directory is on the same disk, each directory is a separate entity, much as each house has its own address.

In many cases, it is easier to use Dual File Lists when you copy files between directories, but it is not required. Many times, you will copy files between directories using only one File List because both the source directory and the destination directory are visible in the same Directory List. In the following examples, Dual File Lists are used.

To copy files from one directory to another using the keyboard, follow these steps:

1. Press Ctrl and the drive letter to activate the source drive. Press Ctrl-C, for example, to activate drive C:.
2. Press Alt-V to open the View menu.
3. Select Dual File Lists from the View menu.
4. Press Tab to activate the lower Directory Tree (the destination directory tree).
5. Using the ↑ and ↓ keys, select the destination directory.
6. Using the Tab key, activate the upper Directory Tree (the source directory tree).
7. Using the ↑ and ↓ keys, select the source directory.
8. Select the files to copy.
9. Press Alt-F to open the File menu.
10. Choose Copy from the File menu.

    The Copy File dialog box appears on-screen. Two text boxes appear in the dialog box—one labeled `From`, containing the files that you selected; the other, labeled `To`, is for you to specify the destination.
11. In the `To` text box, type the directory name to which you want to copy the files (for example, \MISC) and press ↵Enter. Because the source and destination directories are on the same disk you do not have to type the disk letter.

You can use the shortcut key F8 rather than perform Steps 9 and 10.

Using the mouse, follow these steps to copy files to another directory on the same disk:

1. In the Directory Tree, point to the source drive letter and click the left mouse button.
2. Open the View menu and select Dual File Lists. You do not have to use the Dual File Lists display when the source and destination directories are on the same disk, but the display enables you to see the files in both directories at the same time.
3. Use the scroll bar if necessary to select the destination directory.
4. Point to the correct directory in the source Directory Tree and click the left mouse button.

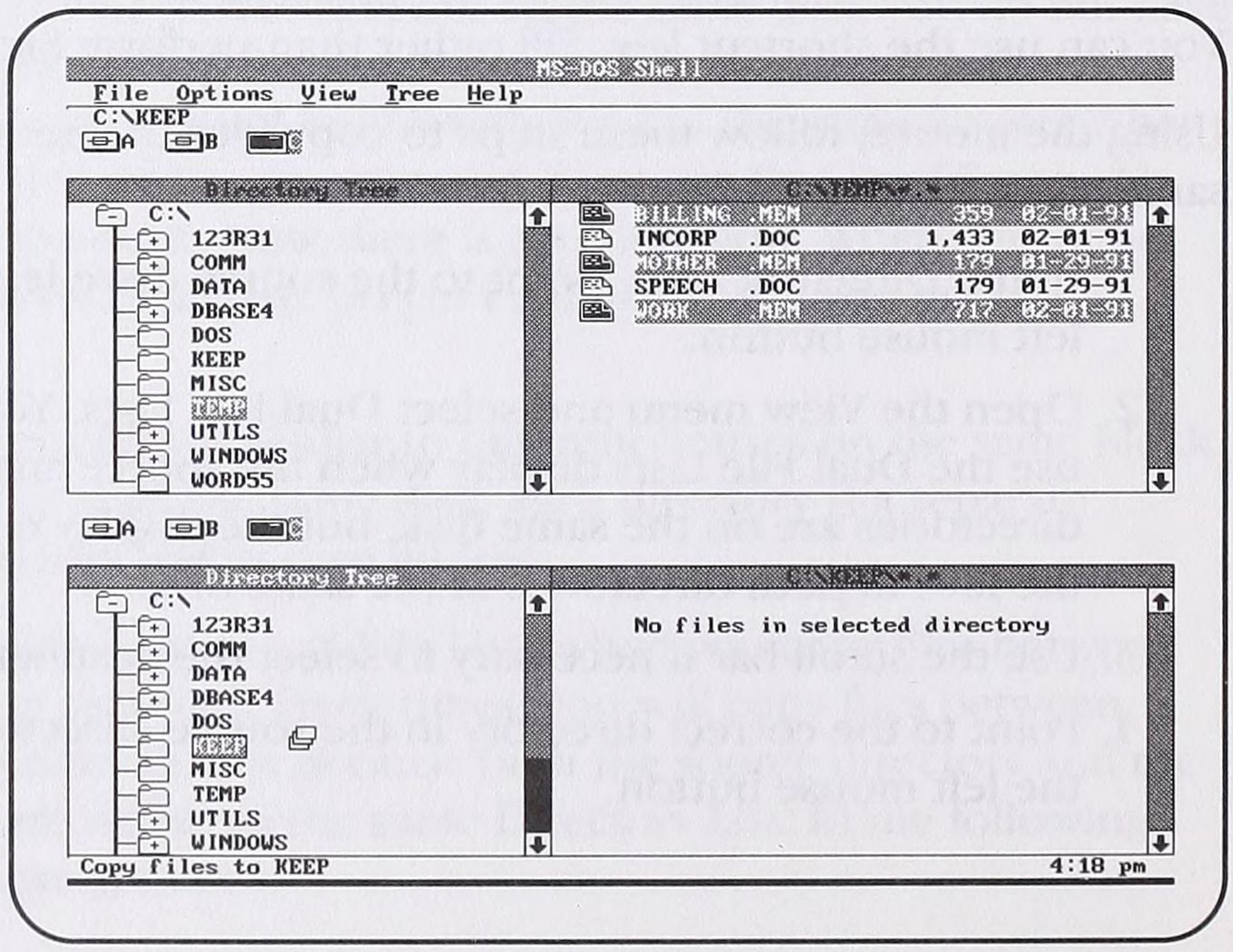
5. Select the files to copy.
6. If you have selected multiple files, press and hold the Ctrl key. Point to one of the files selected with the mouse, press and hold the left mouse button. You then can release the Ctrl key.
7. Drag the selected files to the destination directory.
8. Release the left mouse button to complete the copy.
9. If mouse confirmation is selected, the Confirm Mouse Operation dialog box appears. You must select Yes to complete the copy. This confirmation safeguards you in case you selected the wrong directory. If you did select the wrong directory, then select No.

When you use the mouse to copy files, this is the point-and-shoot method of copying. This method is very accurate because you see the files you have selected, and you select by sight the directory to which you want to copy the files.

As you drag the files, the mouse pointer changes from an arrow to one of two pointers. The first type of pointer is a circle with a line through it, which indicates that you are dragging the files to an invalid area of the screen. If you release the mouse button in an invalid area, nothing happens; no files are copied.

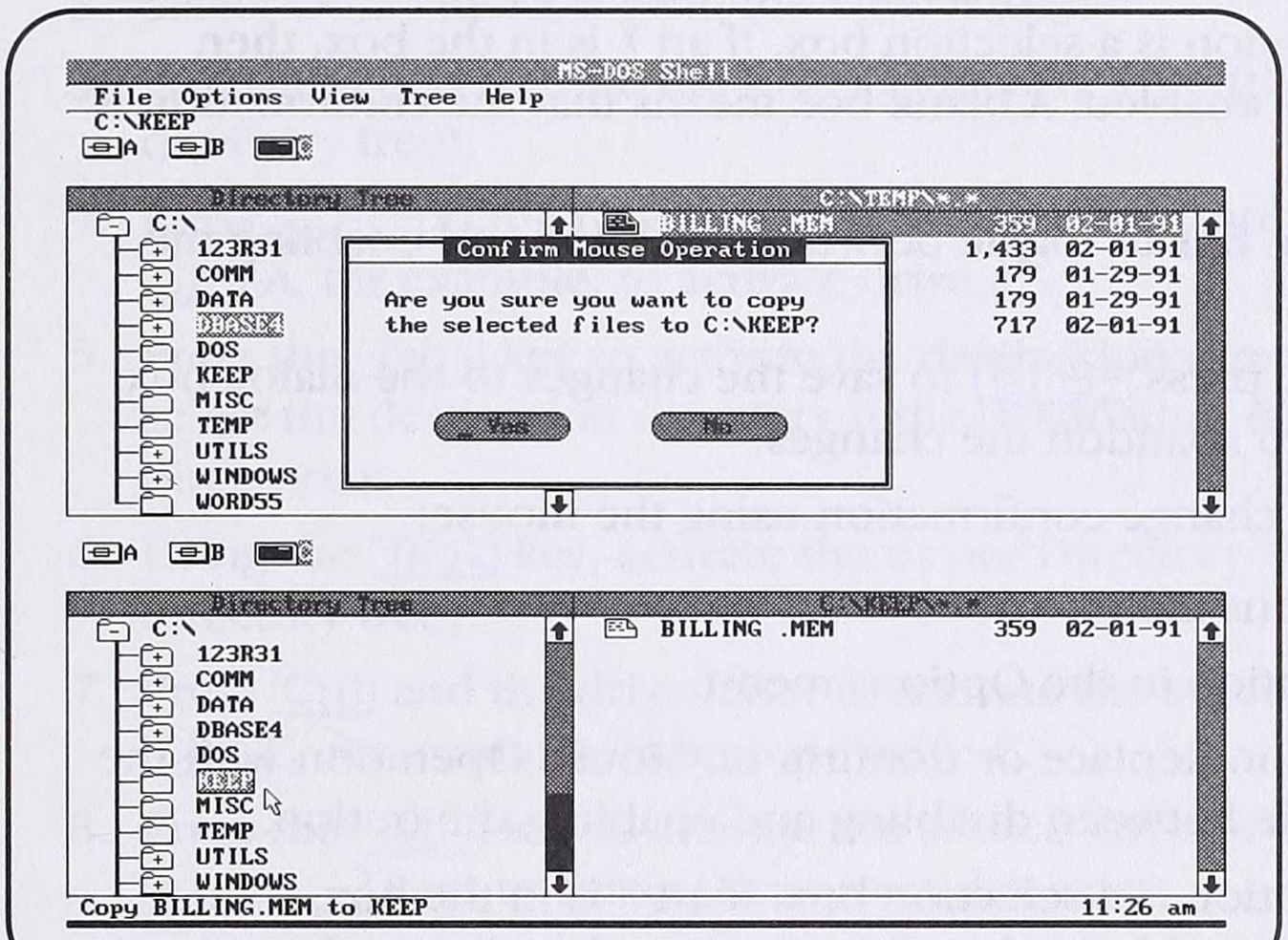
The other pointer looks like three stacked boxes. This pointer signifies that the dragged files are in a valid area. As this pointer crosses each directory, the directory becomes selected. When the correct directory is selected, release the mouse button. The files are copied to this directory.

When you drag selected files to the destination directory, the directory name is highlighted.

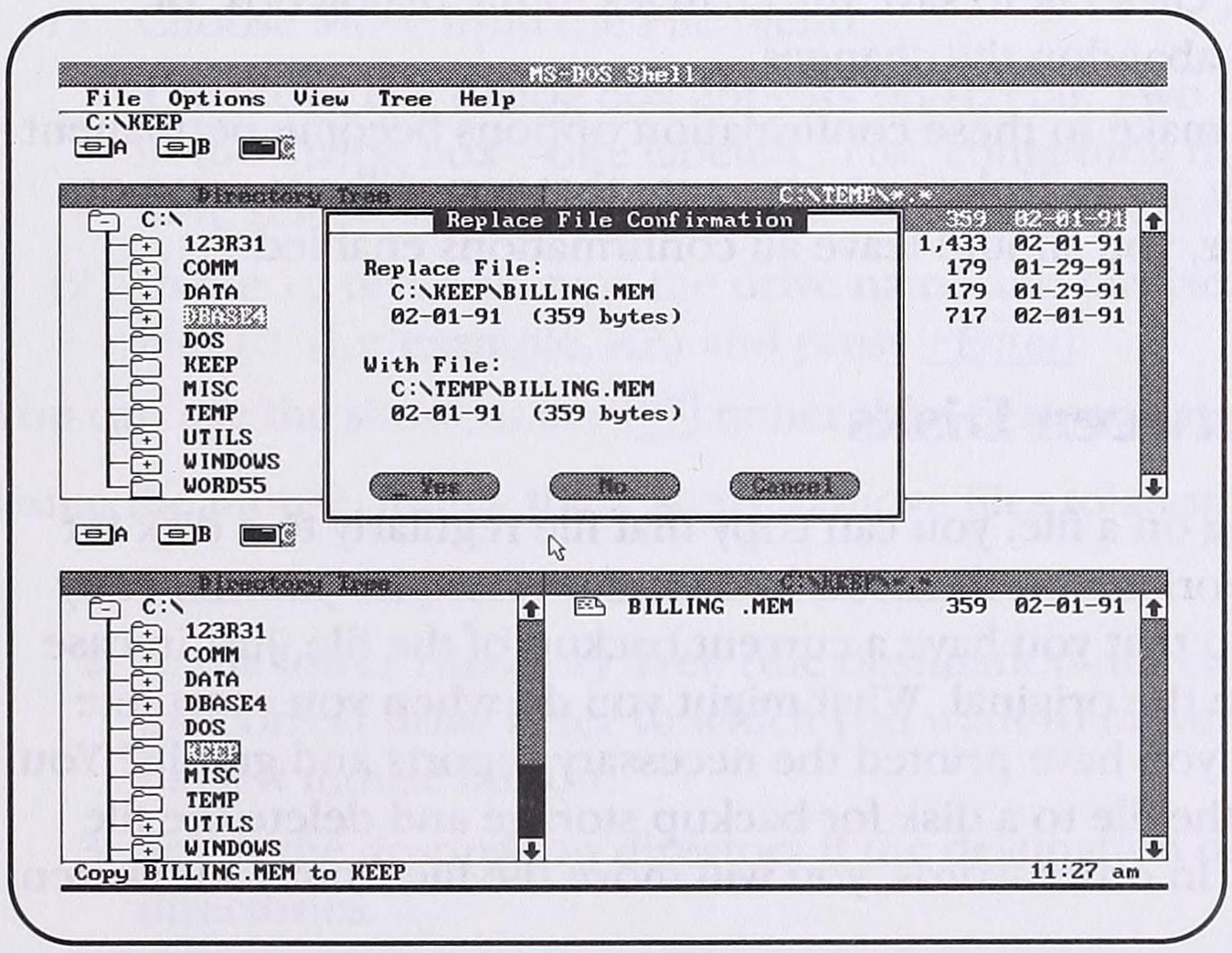


Copying Safety versus Speed

In its default configuration, DOS Shell prompts you before files are replaced. When you copy files over files with the same name, for example, the Replace File Confirmation box appears on-screen. This safety feature helps you to avoid possible disasters.



The Confirm Mouse Operation dialog box requires that you accept a mouse operation before it is performed.



The Replace File Confirmation dialog box displays the file being replaced, the replacement file, and the size and creation date of each file.

You can disable these confirmation prompts to speed up the copy process. Follow these steps using the keyboard to change confirmation:

1. Press Alt-O to open the Options menu.
2. Select Confirmation from the Options menu.
3. Press the Tab key to select Confirm on Replace or Confirm on Mouse Operation.

   Beside each option is a selection box. If an X is in the box, then confirmation is enabled. A blank box means that the confirmation is disabled.
4. Press the **space bar** to toggle between disabling and enabling the option.
5. When finished, press Enter to save the changes to the dialog box, or press Esc to abandon the changes.

Follow these steps to change confirmation using the mouse:

1. Click the Options menu.
2. Click Confirmation in the Options menu.
3. Click Confirm on Replace or Confirm on Mouse Operation with the mouse to toggle between disabling and enabling the option.

   Beside each option is a selection box. If an X is in the box, then confirmation is enabled. A blank box means that the confirmation is disabled.
4. When finished, click OK to save the changes to the dialog box, or click Cancel to abandon the changes.

Any changes that you make to these confirmation options become permanent until you change them again. Unless you are sure that you will not erase or copy over files in error, you should leave all confirmations enabled.

Moving Files Between Disks

While you are working on a file, you can copy that file regularly to a disk for safe keeping. While working on the 1992 budget, for example, you can copy the budget file daily so that you have a current backup of the file, just in case something happens to the original. What might you do when you complete the 1992 budget, and you have printed the necessary reports and graphs? You most likely will copy the file to a disk for backup storage and delete the file from your active disk. In other words, you will move the file from your current disk to another disk.

Moving files from one disk to another is very similar to copying files from one disk to another. In fact, this process is identical, except for one menu choice. Follow these steps using the keyboard to move files from one disk to another (if you are moving to or from a disk, be sure that the disk is in the correct drive):

1. Press Alt-V to open the View menu.
2. Select Dual File Lists from the View menu.
3. Press Tab to activate the lower Directory Tree (the destination directory tree).
4. Press Ctrl and the drive letter to activate the destination drive. Press Ctrl-A, for example, to activate drive A.
5. Press the Tab key to activate the destination directory tree and select the destination directory if the destination disk contains directories.
6. Using the Tab key, activate the upper Directory Tree (the source directory tree).
7. Press Ctrl and the drive letter to activate the source drive. Press Ctrl-C, for example, to activate drive C.
8. Press the Tab key to activate the source directory tree and use the ↑ and ↓ keys to select the correct directory.
9. Select the files to move.
10. Press Alt-F to open the File menu.
11. Choose Move from the File menu.

    The Move File dialog box appears on-screen. Two text boxes appear in the dialog box—one labeled `From`, containing the files that you have selected; the other, labeled `To`, is for the destination.
12. In the `To` text box, type the drive name and directory to move the files to, (for example, **A:**) and press ↵Enter.

You can use the shortcut key F7 rather than perform Steps 10 and 11.

Using the mouse, follow these steps to move files to another disk:

1. Open the View menu and select Dual File Lists.
2. In the lower Directory Tree (the destination directory tree), point to the correct drive letter to which you want to move the files and click the left mouse button.
3. Select the destination directory if the destination disk contains directories.

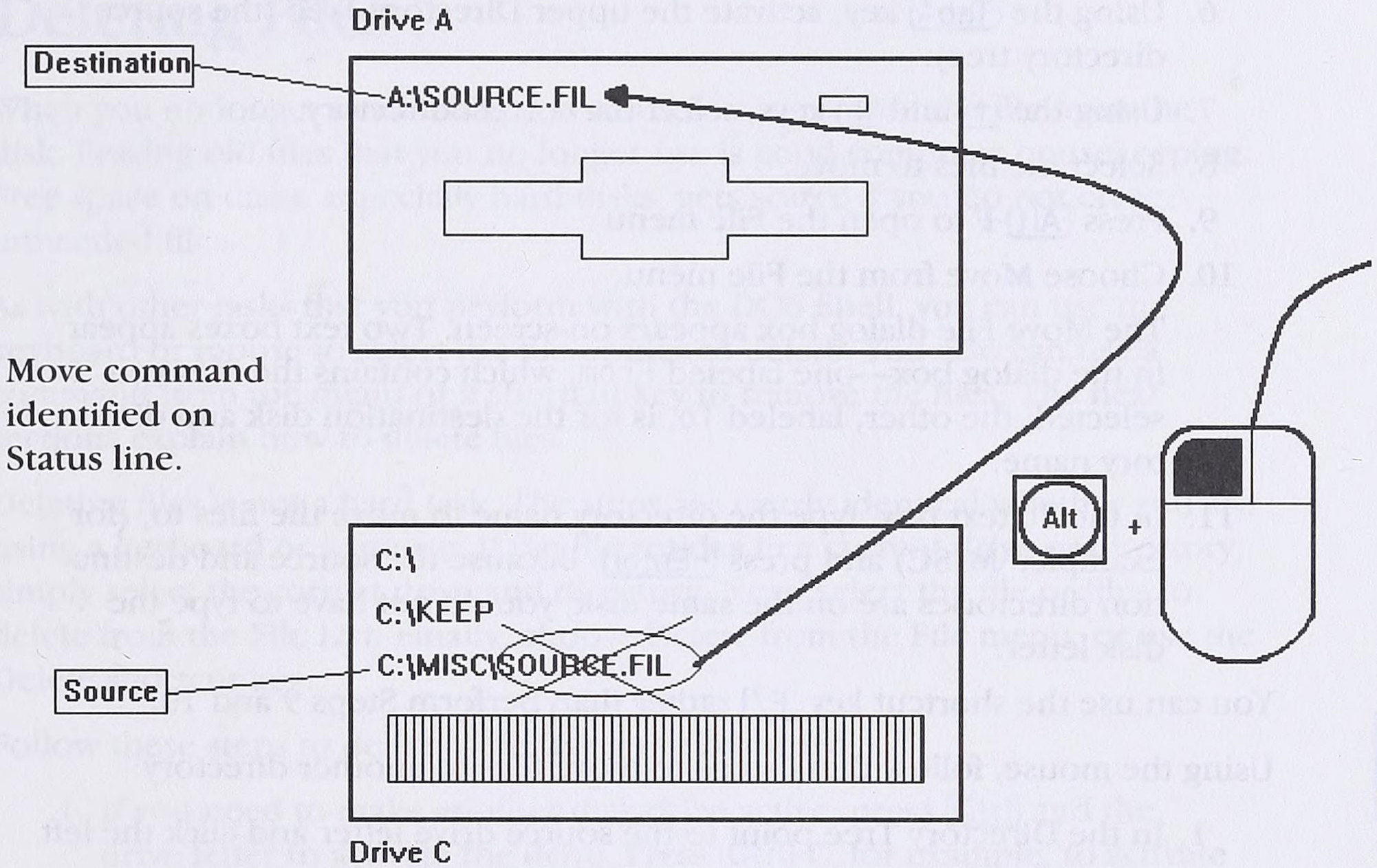
4. In the upper Directory Tree (the source directory tree), point to the correct drive letter from which you want to move the files and click the left mouse button.
5. Point to the correct directory in the source Directory Tree and click the left mouse button.
6. Select the files to move.
7. Press and hold the Alt key. Point to one of the files selected with the mouse, press and hold the left mouse button. You can then release the Alt key.
8. Drag the selected files to the destination directory tree.
9. Release the left mouse button to complete the move.
10. If mouse confirmation is selected, the Confirm Mouse Operation dialog box appears. You must select Yes to complete the move. This confirmation safeguards you in case you selected the wrong disk. If you selected the wrong disk, then select No.

As you drag the files, the mouse pointer changes from an arrow to one of two pointers. The first type of pointer is a circle with a line through it, which indicates that you are dragging the files to an invalid area of the screen. If you release the mouse button when in an invalid area, nothing happens; no files are moved.

The other pointer looks like three stacked boxes. This pointer signifies that the dragged files are in a valid area. When you release the mouse button, the files are moved to this valid area. Be sure that this valid area is the area to which you want the files moved before releasing the button.

Notice, too, the message line when you are dragging files with the mouse. If you forgot to press the Alt key, for example, the message line tells you that you are copying files, rather than moving them.

When moving files using the dragging method, you must hold down the Alt key before you press and hold the left mouse button.



Moving Files to another Directory

Moving files from one directory to another is similar to copying files from one directory to another.

In many cases, it is easier to use Dual File Lists when you move files between directories, but it is not required. Many times, you will move files between directories using only one File List because both the source directory and the destination directory are visible in the same Directory List. In the following examples, Dual File Lists are used.

To move files from one directory to another using the keyboard, follow these steps:

1. Press Ctrl and the drive letter to activate the source drive. Press Ctrl-C, for example, to activate drive C:.
2. Press Alt-V to open the View menu.
3. Select Dual File Lists from the View menu.
4. Press Tab to activate the lower Directory Tree (the destination directory tree).
5. Using the ↑ and ↓ keys, select the destination directory.

6. Using the Tab key, activate the upper Directory Tree (the source directory tree).
7. Using the ↑ and ↓ keys, select the correct directory.
8. Select the files to move.
9. Press Alt-F to open the File menu
10. Choose Move from the File menu.

    The Move File dialog box appears on-screen. Two text boxes appear in the dialog box—one labeled From, which contains the files you selected; the other, labeled To, is for the destination disk and directory name.
11. In the To text box, type the directory name to move the files to, (for example, \MISC) and press ↵Enter. Because the source and destination directories are on the same disk, you do not have to type the disk letter.

You can use the shortcut key F7 rather than perform Steps 9 and 10.

Using the mouse, follow these steps to move files to another directory:

1. In the Directory Tree point to the source drive letter and click the left mouse button.
2. Open the View menu and select Dual File Lists. You do not have to use the Dual File Lists display when the source and destination directories are on the same disk, but the display enables you to see the files move from one directory to another.
3. Use the scroll bar if necessary to select the destination directory.
4. Point to the correct directory in the source Directory Tree and click the left mouse button.
5. Select the files to move.
6. Press and hold the Alt key. Point to one of the files selected with the mouse, press and hold the left mouse button. You can then release the Alt key.
7. Drag the selected files to the destination directory.
8. Release the left mouse button to complete the move.
9. If mouse confirmation is selected, the Confirm Mouse Operation dialog box appears. You must select Yes to complete the move. This confirmation safeguards you in case you selected the wrong directory. If you selected the wrong directory, select No.

Deleting Files

When you no longer need a file, you can select to remove the file from the disk. Erasing old files that you no longer use is good computer housekeeping. Free space on disks, especially hard disks, gets scarce if you do not erase unneeded files.

As with other tasks that you perform with the DOS Shell, you can use the keyboard or mouse to select the file or files to delete. You also can use a command from the menu or a shortcut key to remove the files. The next sections explain how to delete files.

Deleting files is not a hard task. The steps are nearly identical whether you are using a keyboard or a mouse. If the file resides in a current drive or directory, simply select the correct drive and directory. Next, select the file or files to delete from the File List. Finally, choose Delete from the File menu, or use the Delete shortcut key.

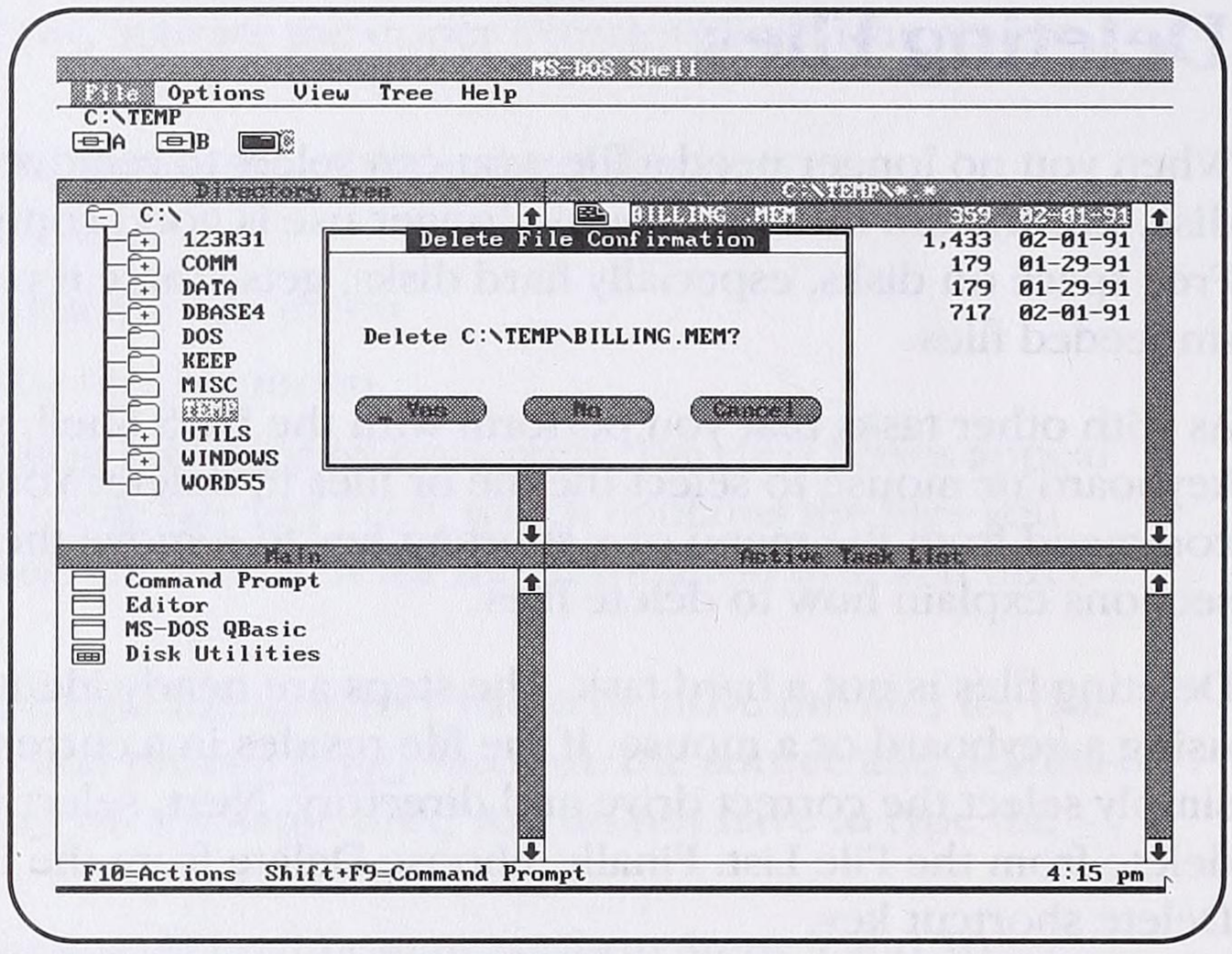
Follow these steps to delete a file using the keyboard:

1. If you need to make another disk drive active, press Ctrl and the drive letter to activate the drive. Press Ctrl-C, for example, to activate drive C:.
2. Press the Tab key to activate the Directory Tree. Use the ↑ and ↓ keys to select the correct directory.
3. Press the Tab key to activate the File List for the current directory.
4. Select the file or files to delete.
5. Press Alt-F to select the File menu.
6. Select Delete from the File menu.
7. Follow the dialog boxes that appear on-screen.

If you selected multiple files to delete, the Delete File dialog box appears on-screen. In the text box contained in the dialog box, all the files that you selected are displayed. You can press the Tab key to select this text box and use the arrow keys to review the file selections.

If you have Delete Confirmation enabled, then you must press ↵Enter at the Delete File Confirmation dialog box to delete each file.

The file or files are deleted from the disk.



The DOS Shell default of confirming a file deletion can keep you from accidentally deleting the wrong file.

Using the mouse to delete files, follow these steps:

1. If you need to make another disk drive active, click the correct drive icon.
2. Click the directory from which to delete files. Use the scroll bar to view directories not on-screen.
3. Select the file or files to delete.
4. Select the File menu.
5. Select Delete from the File menu.
6. If you have Delete Confirmation enabled, then you must click OK in the Delete File Confirmation dialog box to delete the file.

Whether you use the keyboard or the mouse, after you select the file or files to delete, you can press the Del key to delete the files instead of selecting Delete from the File menu.

Renaming Files

From time to time, you may want to rename a file. You might, for example, have a file called BUDGET.DOC that contains information about your current household budget. At the end of 1991, you want to start a new budget for 1992, called BUDGET.DOC. You cannot have two files with the same name in the same directory, so you rename BUDGET.DOC to BUDGET91.DOC.

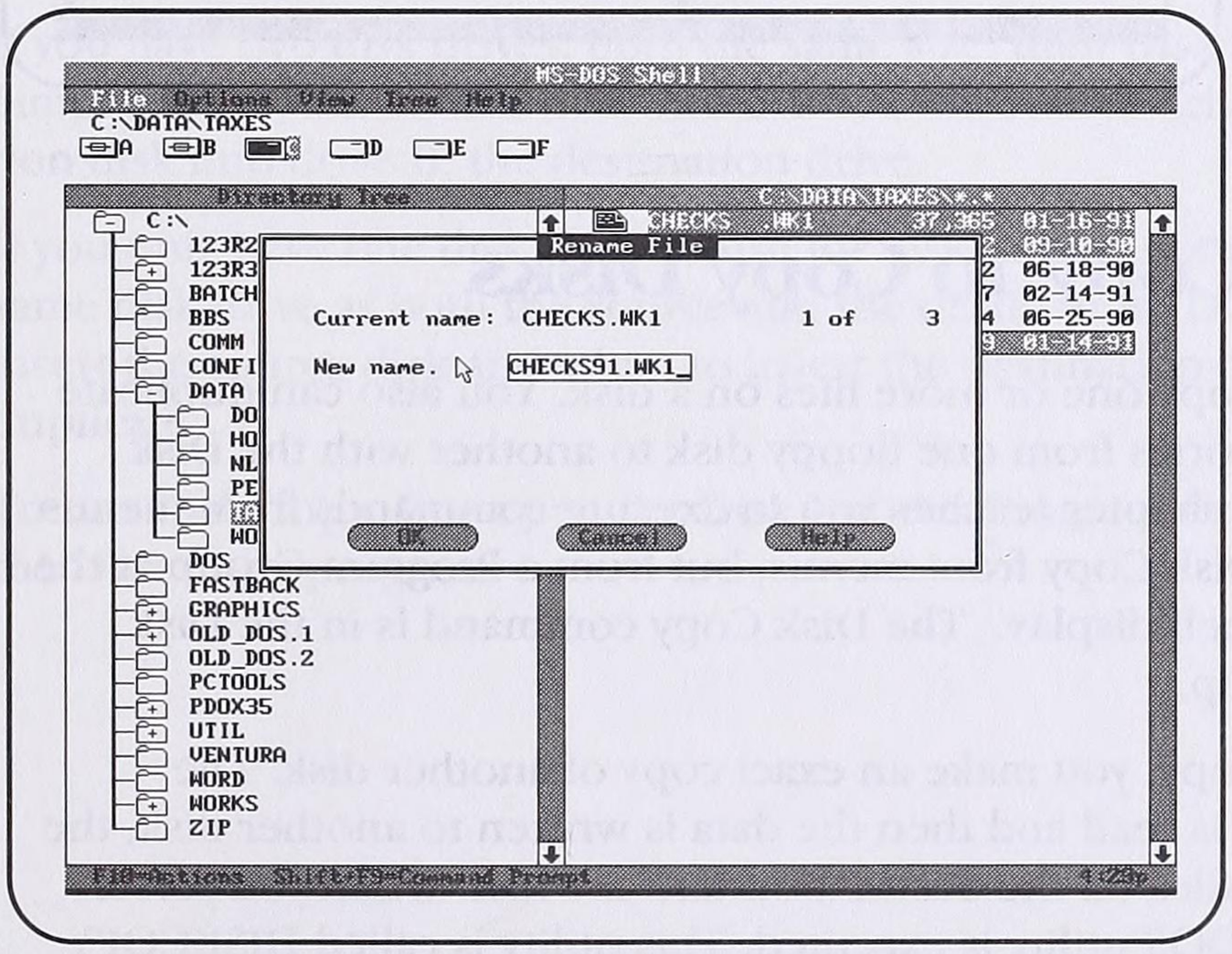
If you created a file with the wrong name (TAXAS.WK1 instead of TAXES.WK1, for example), you would want to rename it.

Follow these steps to rename a file using the keyboard:

1. Press Ctrl and the drive letter to activate the correct drive. Press Ctrl-C, for example, to activate drive C:
2. Press the Tab key to activate the directory tree and use the ↑ and ↓ keys to select the correct directory.
3. Select the files to move.
4. Press Alt-F to open the File menu
5. Choose Rename from the File menu.
6. In the New name box, type the new file name and press ↵Enter.

Follow these steps to rename a file using a mouse:

1. Point to the correct drive letter and click the left mouse button.
2. Point to the correct directory in the Directory Tree and click the left mouse button.
3. Select the files to rename.
4. Point to the File menu and click the left mouse button.
5. Point to the Rename option and click the left mouse button.
6. In the New name box, type the new file name and press ↵Enter.

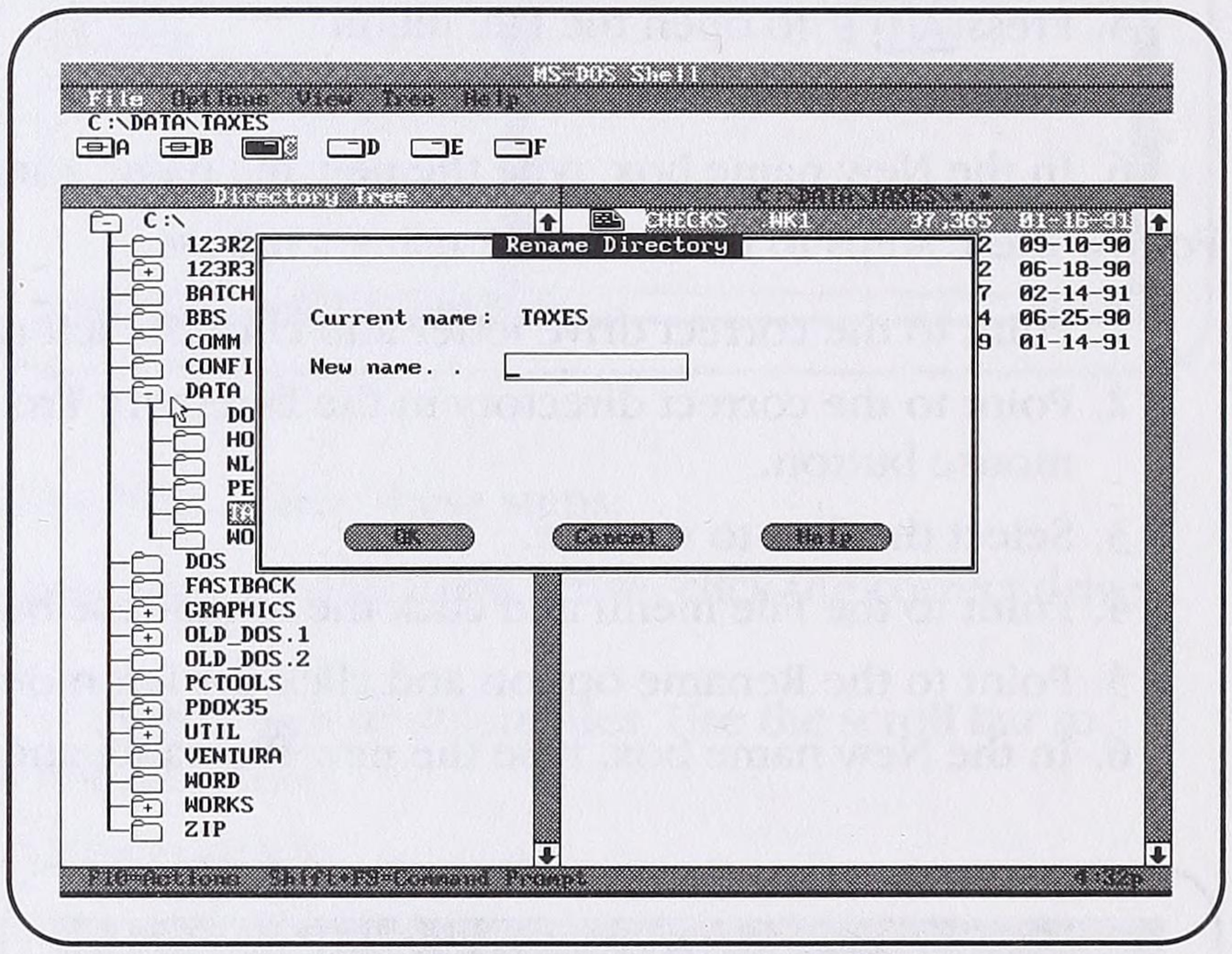


The Rename File dialog box appears on-screen. The current name is listed above the text box in which you enter the new name.

To rename more than one file in one directory, select the files you want to rename and choose Rename from the File menu. DOS presents you with a separate Rename file dialog box for every selected file. When you complete one dialog box, DOS renames that file and shows you the dialog box for the next file. There is no shortcut key for rename.

You can use the same technique to rename a directory. Just select a directory name with the keyboard or mouse, and then choose Rename from the File menu.

To rename a directory, select the directory, and then choose Rename from the File menu. Enter the new directory name in the dialog box.



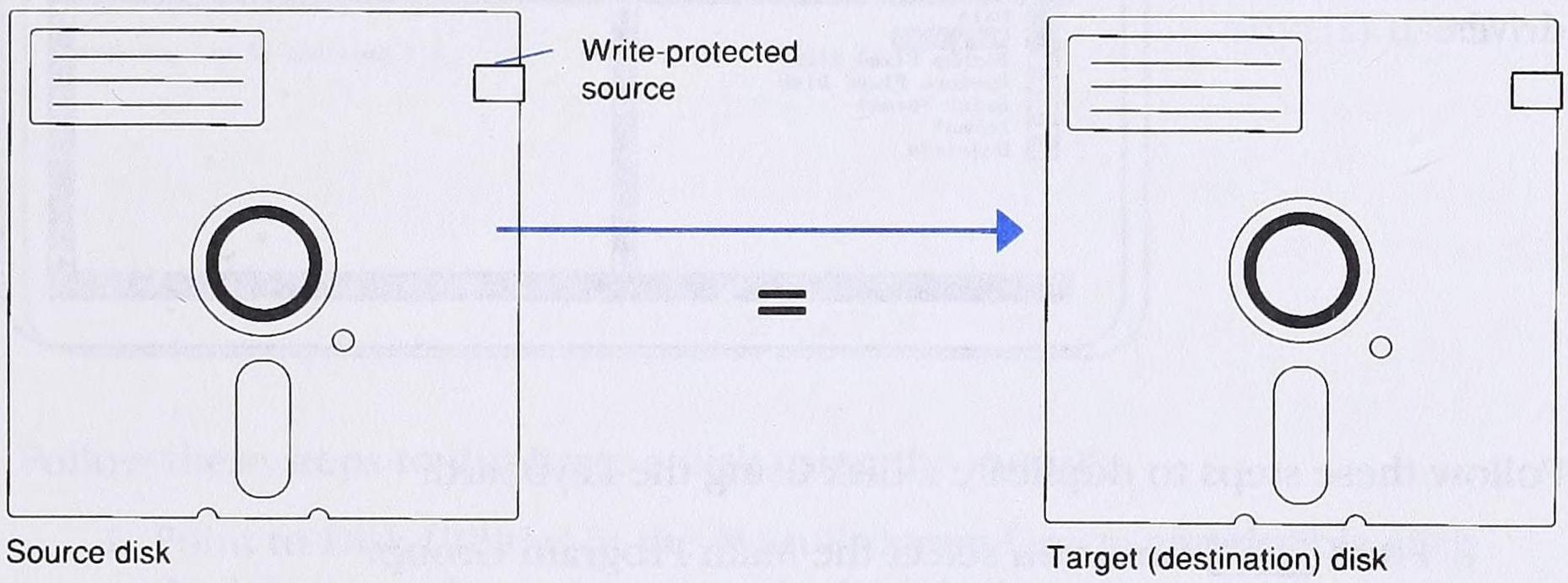
Using Disk Copy To Copy Disks

You learned how to copy one or more files on a disk. You also can duplicate all the files and directories from one floppy disk to another with the Disk Copy command. This chapter teaches you to execute commands from menus. You do not execute Disk Copy from menus, but from a Program Group at the bottom of the DOS Shell display. The Disk Copy command is in the Disk Utilities program group.

When you use Disk Copy, you make an exact copy of another disk. The input, or source, disk is read and then the data is written to another disk, the destination disk. Any files on the destination disk are lost. When you select Disk Copy, an actual DOS utility is executed. This utility is called DISKCOPY.

Disk Copy is good to use when you want to make backup copies of program disks. You then can store the original disks in a safe place. Disk Copy also copies the system files from a bootable source disk to make a copy that is bootable.

The source and destination disks must be the same size and capacity. You cannot use Disk Copy to duplicate a 5 1/4-inch disk onto a 3 1/2-inch disk or vice versa. You will find another Que title, *MS-DOS 5 User's Guide*, Special Edition, helpful if you want more information on DISKCOPY.

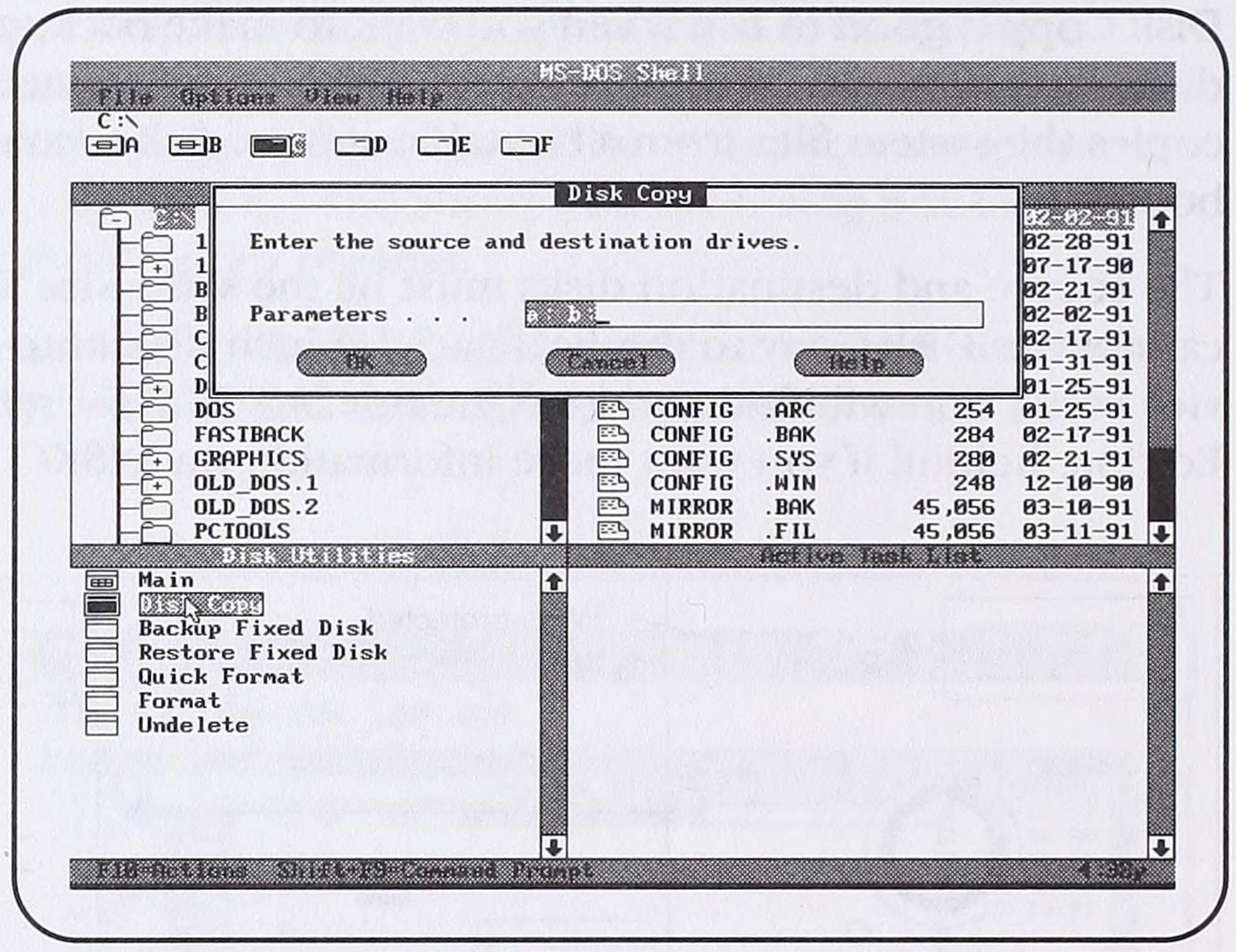


Disk Copy creates a duplicate of another disk. Both source and destination disks must be the same size and capacity.

If you have two disk drives, both the same size, then Disk Copy is a breeze. Simply place your source disk into drive A, the source drive. Place the destination disk into drive B, the destination drive.

If you only have one disk drive to use for disk duplication, you must use the same disk drive as both the source and the destination. DOS tells you when to insert the source disk and when to insert the destination disk as it makes the duplicate.

To run Disk Copy, first open the Disk Utilities Program Group, and then select the Disk Copy program.



The parameters in the Disk Copy dialog box specify the source and the target disk drives.

7

Follow these steps to duplicate a disk using the keyboard:

1. Press Tab until you select the Main Program Group.
2. Press the ↑ or ↓ keys to select Disk Utilities.
3. Press ↵Enter to open the Disk Utilities Program Group.
4. Press the ↓ key to select `Disk Copy` and press ↵Enter.
5. The Disk Copy dialog box appears on the screen.

   The default parameters are `a: b:`, meaning that drives A and B will be the source and destination drives, respectively. Don't worry if you only have one disk drive. DOS assigns one disk drive as both A and B.
6. Press ↵Enter to select OK and begin copying.

   You are prompted for the required disks. If you have two compatible disk drives, then you are prompted to place the source and destination disks into the proper drives. If you have only one disk drive, you are prompted to place the source disk into drive A.
7. When the disk copy is complete, you are asked whether you want to copy another disk. Type **N** and press ↵Enter to return to the DOS Shell.

When the copy is complete, you are prompted to press **Y** to copy more disks or **N** to return to the DOS Shell. If you press Y, you are prompted to place the correct disks into the correct drives. Otherwise, pressing N displays the prompt `Press any key to return to MS-DOS Shell.`

```
Insert SOURCE diskette in drive A:

Press any key to continue . . .

Copying 80 tracks
18 Sectors/Track, 2 Side(s)

Insert TARGET diskette in drive A:

Press any key to continue . . .

Insert SOURCE diskette in drive A:

Press any key to continue . . .

Insert TARGET diskette in drive A:

Press any key to continue . . .

Insert SOURCE diskette in drive A:

Press any key to continue . . .
```

You are prompted for which disks are required in the drive(s) used.

Follow these steps to duplicate a disk using the mouse:

1. Point to Disk Utilities in the Main Program Group and double click the left mouse button to open the Disk Utilities Program Group.
2. Point to Disk Copy and double-click the left mouse button.
3. The Disk Copy dialog box appears on the screen.

   The default parameters are `a: b:`, meaning that drives A and B will be the source and destination drives, respectively. Don't worry if you only have one disk drive. DOS assigns one disk drive as both A and B.
4. Click the OK button in the dialog box to begin copying.

   If you have two compatible disk drives, you are prompted to place the source and destination disks into the proper drives. If you have only one disk drive, you are prompted to place the source disk into drive A:.
5. Press N and ↵Enter to return to the DOS Shell.

Remember, you can use two disk drives to duplicate disks only if the drives are compatible. If your system contains two 360K floppy drives, for example, Disk Copy works fine.

If you have only one disk drive, you can use these procedures as if you had two drives. DOS considers your one drive as both drive A and drive B. Just follow the prompts to insert the source disk and the target disk. You may have to switch disks a number of times before the Disk Copy is complete.

If you have one or two 1.2M drives, you can use Disk Copy with 360K disks, but the disks may not be readable on some 360K drives on other computers. If you have one or two 1.44M drives, you can use Disk Copy with 720K disks with no trouble.

Using Disk Copy with Different Types of Drives

When you have two different types of drives, the Disk Copy procedure is more complicated. You may have to specify the same drive letter as both the source and target drive in the Disk Copy dialog box or you will get an error message that the drive types or disk types are incompatible.

If drives or disks are incompatible, an error message appears and the copy operation stops.

Four types of floppy disk drives are in common use:

- High capacity 5 1/4-inch drives (1.2M)
- Low capacity 5 1/4-inch drives (360K)
- High capacity 3 1/2-inch drives (1.44M)
- Low capacity 3 1/2-inch drives (720K)

You can use both drives if you have any of the following situations:

- Both drives are the same size.
- You want to Disk Copy a low capacity disk.
- With 5 1/4-inch drives, you use the low capacity drive as the target drive. (This procedure is not a DOS requirement, but if you use the high capacity drive as the target drive, the disk may not be readable on some low capacity drives of other computers.)

You must use a single drive letter in the following situations:

- Your two drives are different sizes (one 5 1/4-inch drive and one 3 1/2-inch drive).
- You have a high capacity drive and a low capacity drive and you want to Disk Copy a high-capacity disk.

In all the following examples, the procedures to use Disk Copy are exactly the same as the procedures in the last section except for the parameters in the Disk Copy dialog box.

If you have a 1.2M drive A and a 360K drive B:

- To Disk Copy a 360K disk, use the 1.2M drive A as the source drive and the 360K drive B as the target drive. The parameters are **a: b:**.
- To Disk Copy a 1.2M disk, use the 1.2M drive A as both the source and the target drive. The parameters are **a: a:**. Follow the prompts to switch disks.

If you have a 1.44M drive A and a 720K drive B:

- To Disk Copy a 720K disk, use the 1.44M drive A as the source drive and the 720K drive B as the target drive. The parameters are **a: b:**.
- To Disk Copy a 1.44M disk, use the 1.44M drive A as both the source drive and the target drive. The parameters are **a: a:**. Follow the prompts to switch disks.

If you have a 5 1/4-inch drive A and a 3 1/2-inch drive B:

- To Disk Copy a 5 1/4-inch disk, use the 5 1/4-inch drive A as both the source drive and the target drive. The parameters are **a: a:**. Follow the prompts to switch disks.
- To Disk Copy a 3 1/2-inch disk, use the 3 1/2-inch drive B as both the source drive and the target drive. The parameters are **b: b:**. Follow the prompts to switch disks.

Verifying With Disk Copy

Often, disks that you copy contain very important information. Your disk might contain documents concerning the incorporation of your business. When copying this disk, you want to be sure the copy is as accurate as possible.

Before you leave your house, you no doubt lock your door. And when you close your door, you probably wiggle the door knob just to verify that the door really is locked. You do this to protect the contents of your house. Just as you wiggle the door knob, you can instruct Disk Copy to wiggle its knob, or verify the copy, ensuring that the contents of the disk are protected.

You verify Disk Copy through the use of the /V switch. This switch instructs Disk Copy to reread the destination disk once it has transferred information. You enter the /V switch in the Parameters text box where you give the drive parameters.

Follow these steps to enter the /V verify switch:

1. Start Disk Copy with either the keyboard or mouse.
2. When the Disk Copy dialog box appears on-screen, enter the correct drive parameters, followed by a space and **/V**.

   To use only drive A as the source and destination, type the following parameters:

   a: a: /V

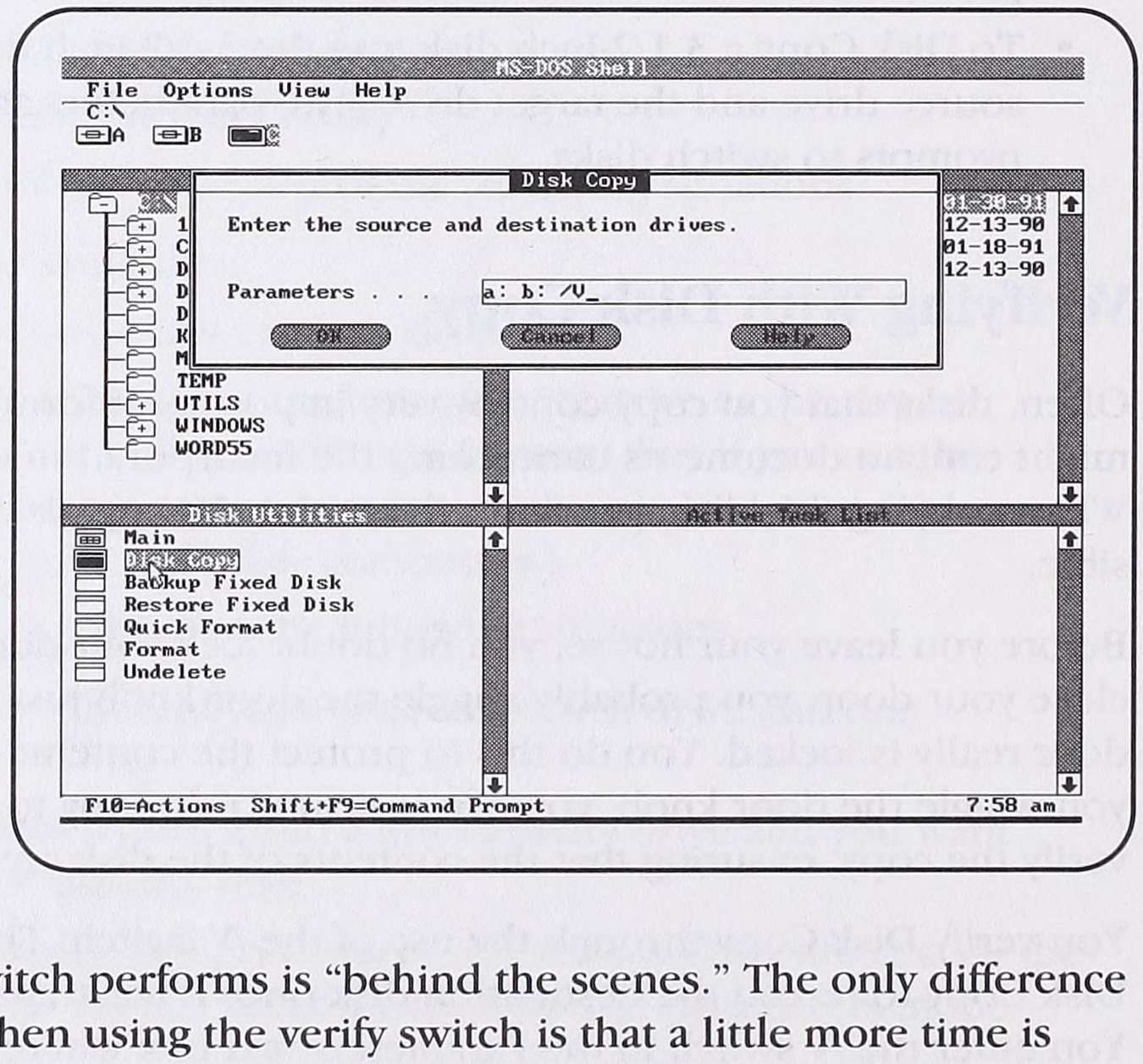
   To use drive A as the source and drive B as the destination, type the following parameters:

   a: b: /V

3. Press Enter or click the OK button with the mouse to begin Disk Copy.

Disk Copy prompts for the correct disks to be placed in the correct drives. When the disk has been copied, you are prompted to press **Y** to copy another disk.

When using Disk Copy, use the /V switch to verify that data is duplicated correctly.



All the work the /V switch performs is "behind the scenes." The only difference that you can notice when using the verify switch is that a little more time is needed to complete the copy process. There is no visible means of telling that the disk is being verified.

Lessons Learned

The computer revolution enables text to be copied more quickly and accurately than ever before.

- The Copy command copies single or multiple files on one disk or from one disk to another.
- The Copy command places a copy of a file into any directory you want.
- The Move command enables you to move files from one disk or directory to another.
- The Delete command deletes one or more files.
- The Rename command renames one or more files or directories.
- Disk Copy makes an exact copy of a disk.

Now that you know the basics of using DOS, it's time to learn how to use your computer for the reason you bought one in the first place: to run application programs. That topic is taken up in Chapter 8.

7

8

Running Applications

Understanding and using programs and program groups

Running programs from program groups

Running programs with the RUN command

Running programs from the file list

Understanding Associations

Do you remember when you got your first bicycle? You couldn't wait to go outside and ride around. Your first attempts were pretty shaky, but soon you were cruising all over the neighborhood.

At first, you rode your bicycle for fun. Later, you started to use it for transportation: you rode to a friend's house or to the playground. Your bike was still fun, but it was also useful.

You probably won't find DOS as much fun as your first bike. Although you can play with your personal computer, you probably bought the computer because it is useful. DOS is necessary to help you with the main reason you have the computer: to run application programs.

Most people use a personal computer primarily for word processing. The next most common use is working with spreadsheets. Both types of programs are applications programs. Your computer isn't limited to this kind of work, though. Games and graphics programs are becoming increasingly popular, and these are also applications programs.

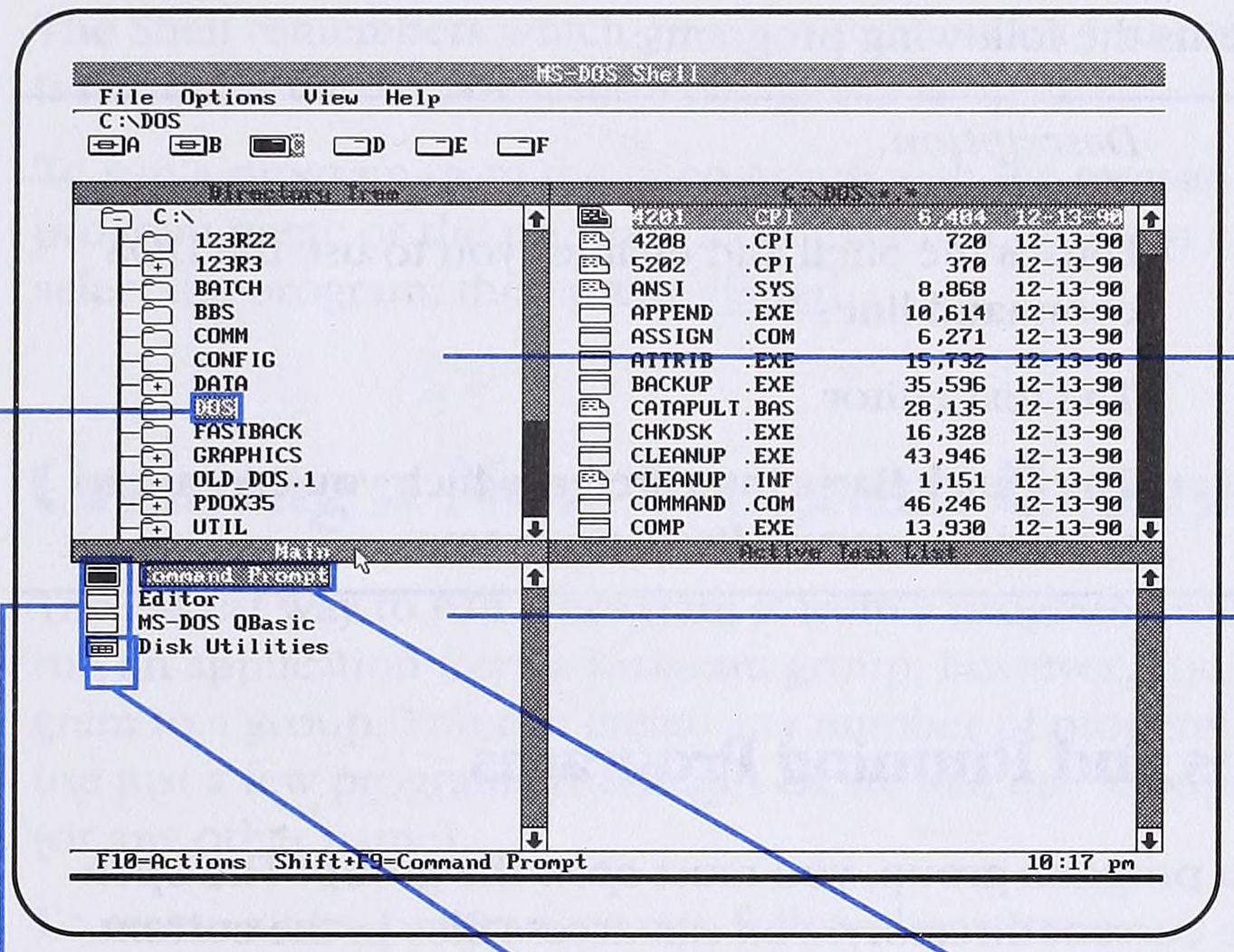
So now you get to the work (and fun and games) of using your personal computer.

Key Terms Used in This Chapter

Program Group	A set of programs that you group together (like a file folder that contains only programs).
Properties	Information about a program or a program group that tells DOS how to display information and how to execute the program(s).
Association	A relationship that you establish between a program and a file extension.
Parameter	Additional information that you provide to DOS when you execute a command or a program. When you use the DOS Shell, you can save parameters and DOS uses those parameters when you execute the application.
Replaceable Parameter	A parameter that you specify each time you execute a program.

Understanding Programs and Program Groups

Throughout this book, you have learned how to execute (run) various DOS commands. Some of these commands, such as FORMAT, BACKUP, and RESTORE, are programs in the DOS directory. You execute these programs in the Shell by opening the Disk Utilities *program group* in the Program area and then selecting the appropriate program. This chapter describes program groups in more detail and shows you how to build your own program groups and add programs to groups.



DOS creates the Main program group and the Disk Utilities program group. Main is the root program group. You can tell that Disk Utilities is also a group because group icons are different from program icons.

Program groups are like file folders for programs. Inside each program group are programs. You also can have program groups inside other program groups.

The Original DOS Groups

When you install DOS, you start out with two program groups: the Main group and the Disk Utilities group. The Main group is similar to the root directory on a disk. You can have programs and other groups in the Main group. All programs in the Program area are in the Main group or in program groups inside the Main group. When you install DOS, the only program group in the Main group is the Disk Utilities group. The Main group is the *parent* of the Disk Utilities group. The Disk Utilities group is the *child* of the Main group. This relationship is similar to the subdirectory tree you learned about in Chapter 5.

The Main group contains the following programs:

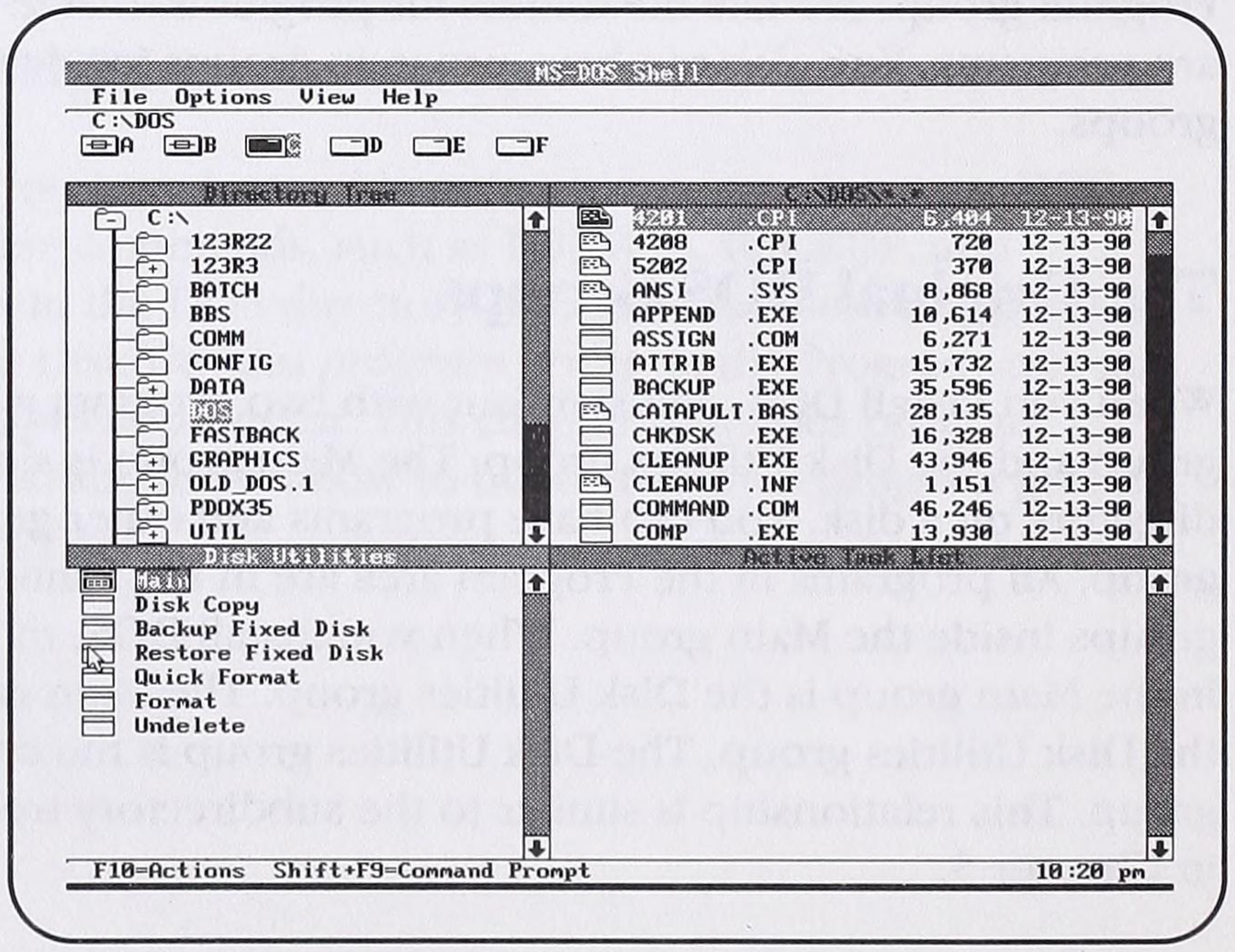
Program	*Description*
Command Prompt	Pauses the Shell and enables you to use the DOS command line.
Editor	The text editor.
QBasic	The Quick Basic interpreter, which you can use to write and execute Basic programs.

Opening Groups and Running Programs

To run a program in a program group, you must *open* the group. The open group is similar to the current directory: you can access files in the current directory and you can run programs in the open group. When you first start the Shell after installing DOS, the Main group is open.

To open a group with the mouse, double-click the group name or the group icon. To open a group with the keyboard, select the group, then press ↵Enter. (To select a group, press Tab⇥ repeatedly until the Program area is selected, then use the ↓ and ↑ keys to select the program group. For more information on selecting, refer to Chapter 4.)

When you open a program group, DOS displays a list of the programs in that group. When the open group is not the main group, the first icon in the program list is for the parent of the open group.



The Shell remembers which group is open when you exit the Shell. The next time you enter the Shell, the same group is open.

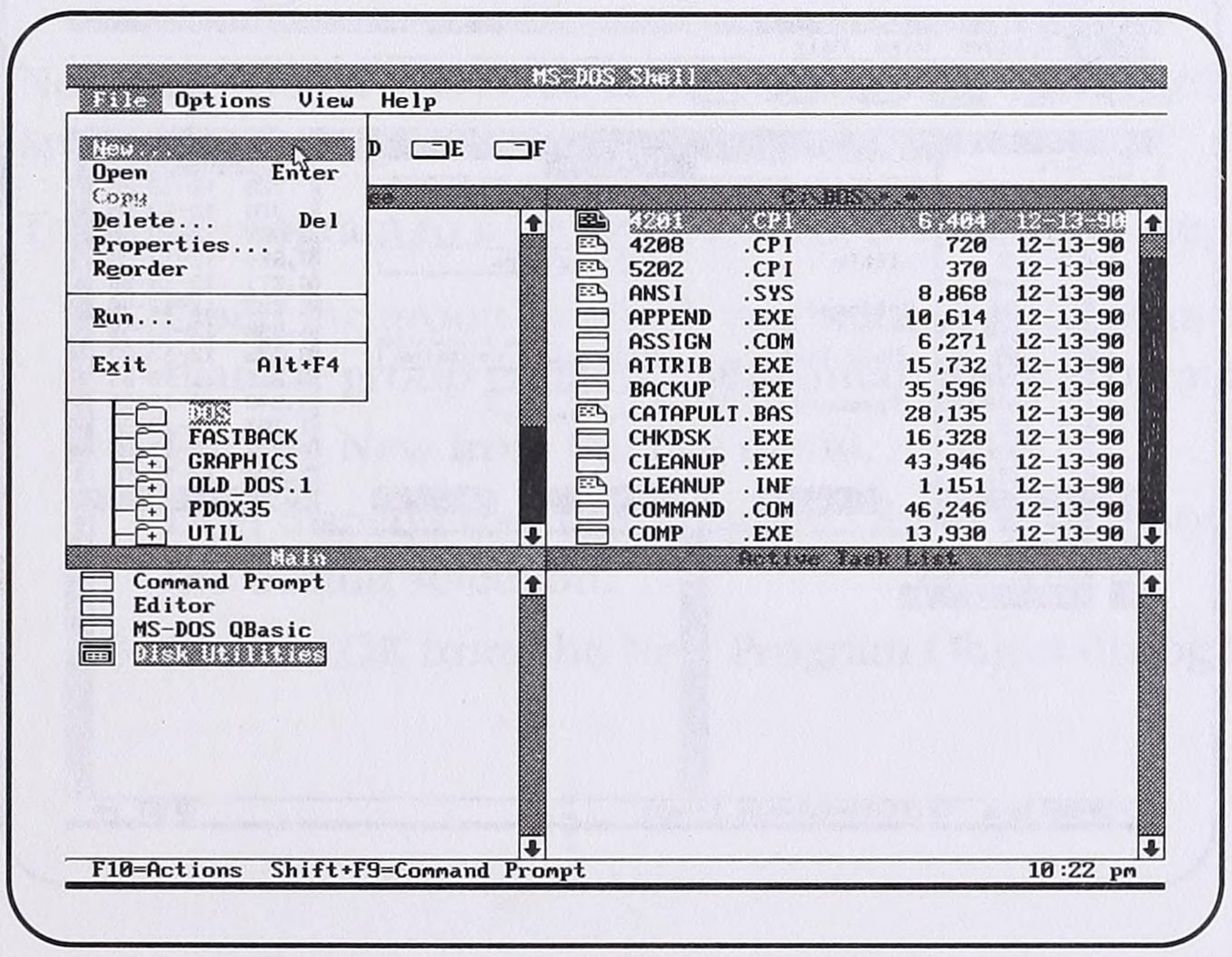
To run a program from the open group with the mouse, double-click the program name or the program icon. To run a program with the keyboard, select the program, then press ↵Enter.

Creating a New Program Group

The easiest way to run a program is from a program group. Before you can run an application from a program group, however, you must add the program to a group. You can create any number of program groups, but if you use just a few programs you might create just one group named Applications (or any other name).

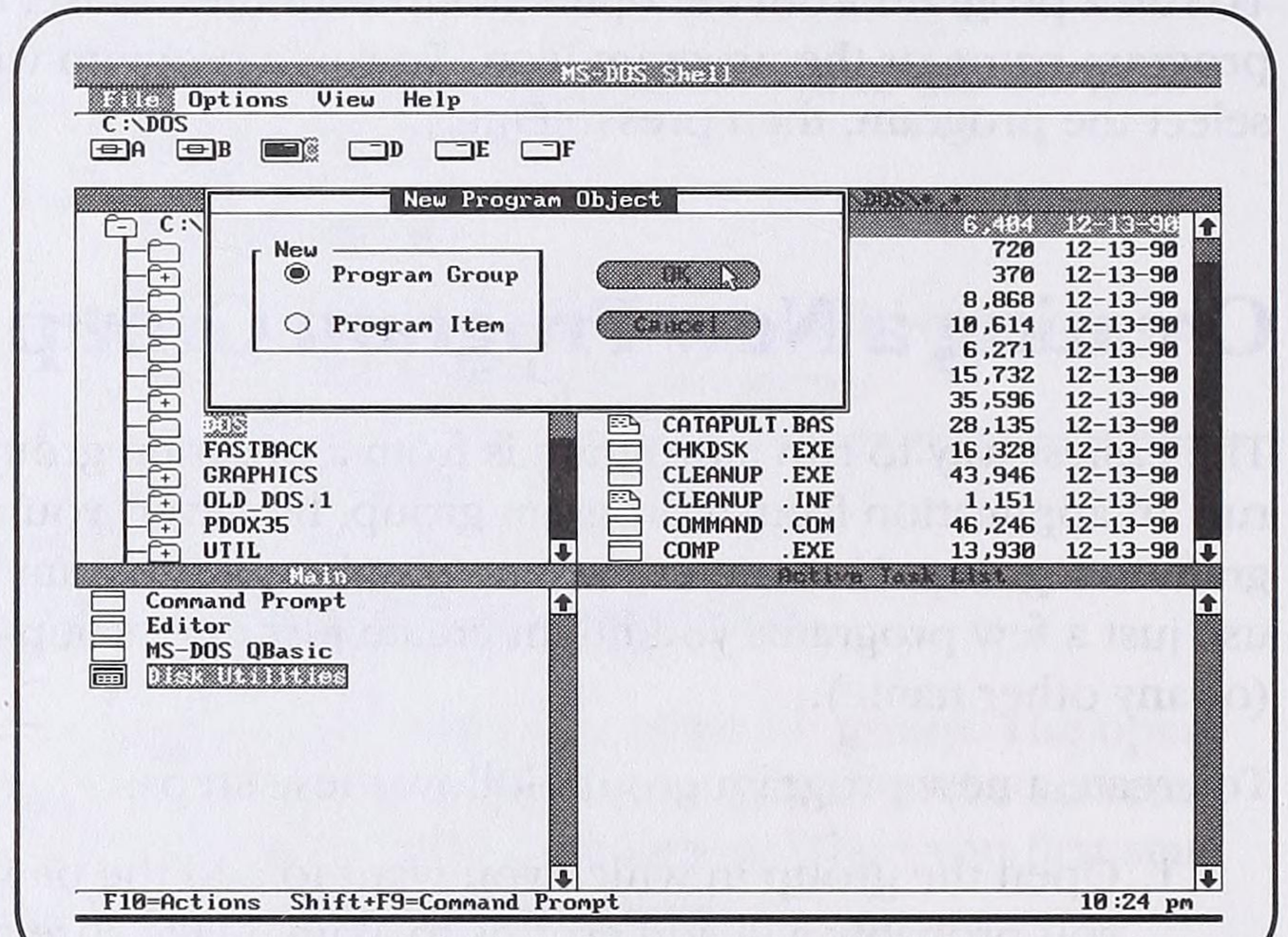
To create a new program group, follow these steps:

1. Open the group in which you want to add the new group. Initially, you probably will add groups to Main. Make sure that the open group name is highlighted in the program area title bar. Within the open group, it does not matter which program or program group is highlighted.
2. Choose New from the File menu.



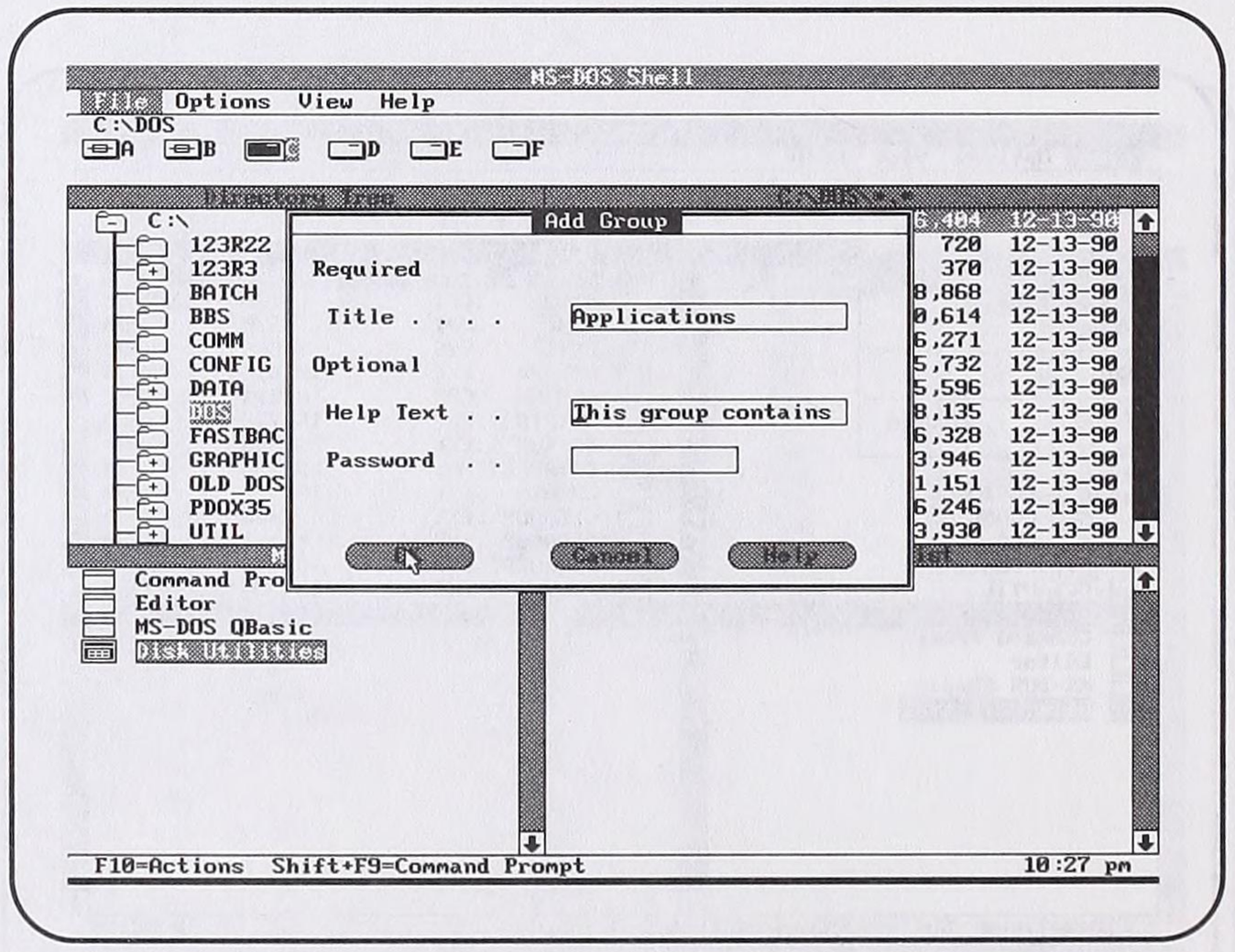
The File menu contains different options when a program group is highlighted than when the directory tree or Files area is highlighted. If the File menu does not appear as shown in the figure, the highlight must be in another area.

3. Choose the Program Group option from the New Program Object dialog box and choose OK.

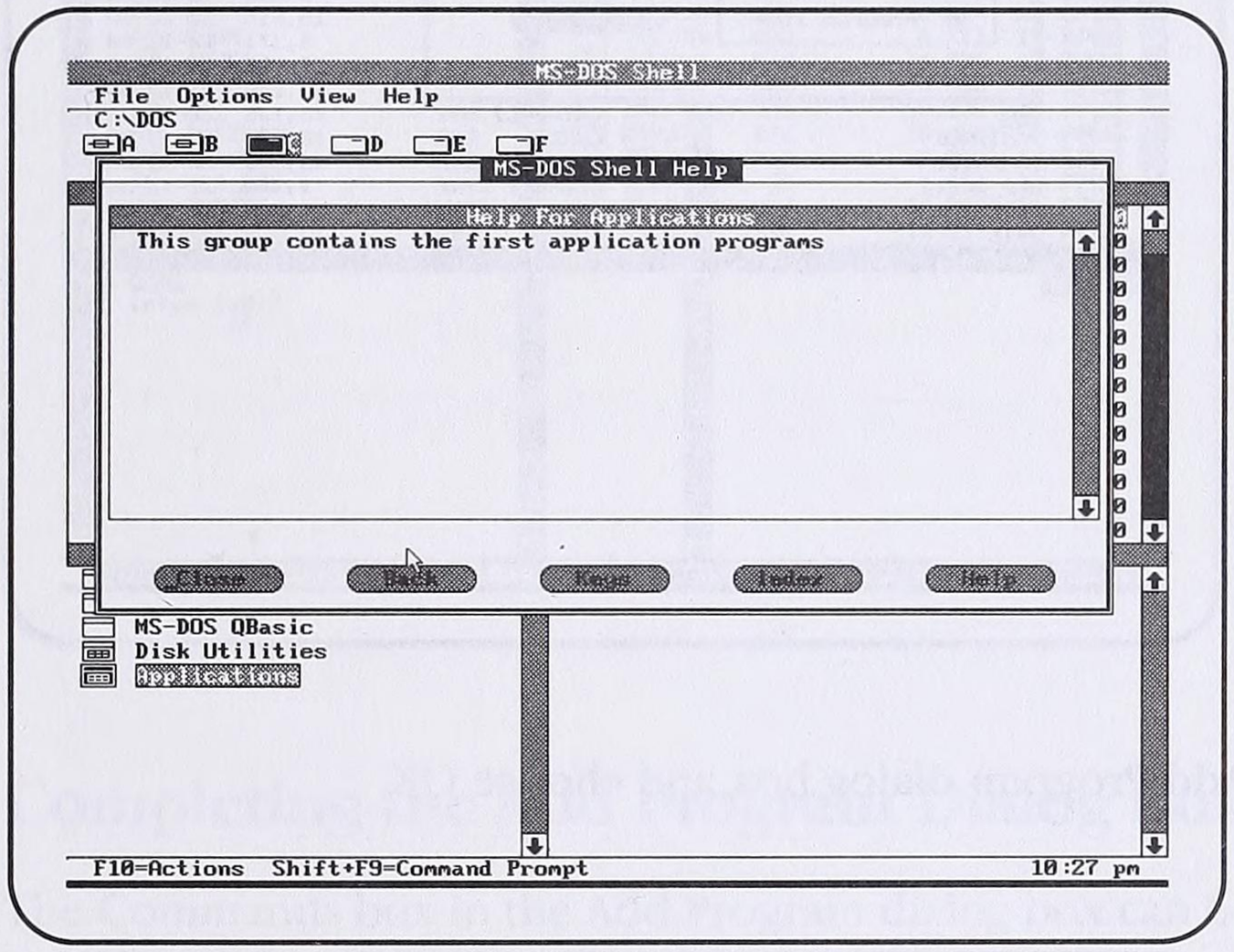


4. Complete the Add Group dialog box and choose OK. Only the group title (the name of the group) is required.

The name you enter in the title appears in the Program area with a program group icon.



The title can be as long as 74 characters. The optional help text can display information about the group when you highlight the group title and press F1. If you password-protect the group, you must enter the password in order to open the group.



The new group appears with a group icon in the Main group.

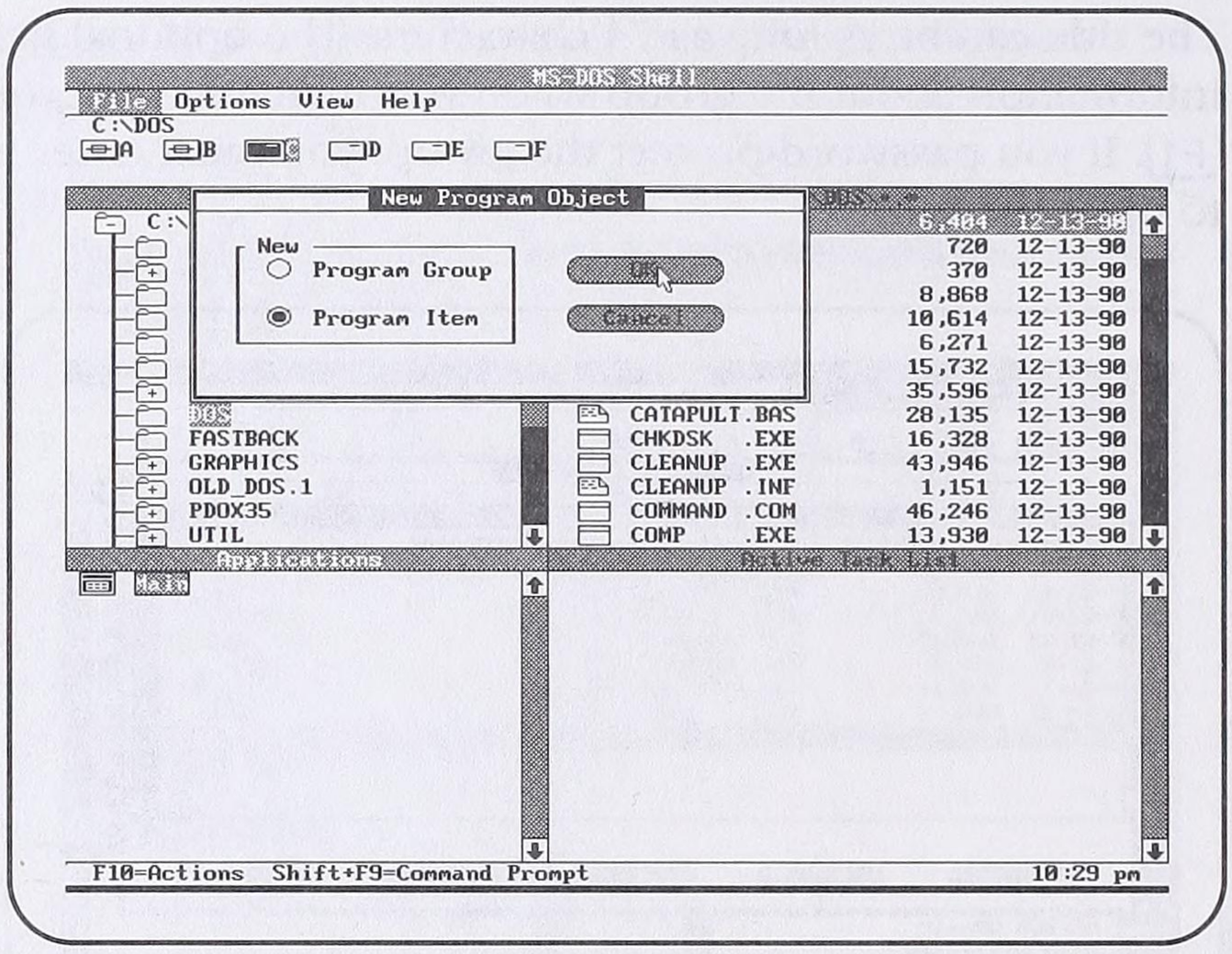
Adding a Program to a Program Group

Now that you have created an Applications program group, you can add your applications programs to that group.

To add a program to a program group, follow these steps:

1. Open the group in which you want to add the program. Make sure that the group name is highlighted in the Program area.
2. Choose New from the File menu.
   DOS displays the New Program Object dialog box. Program Item is the default selection.
3. Choose OK from the New Program Object dialog box.

Make sure that the correct program group is open before you add a program to the group.



4. Complete the Add Program dialog box and choose OK.

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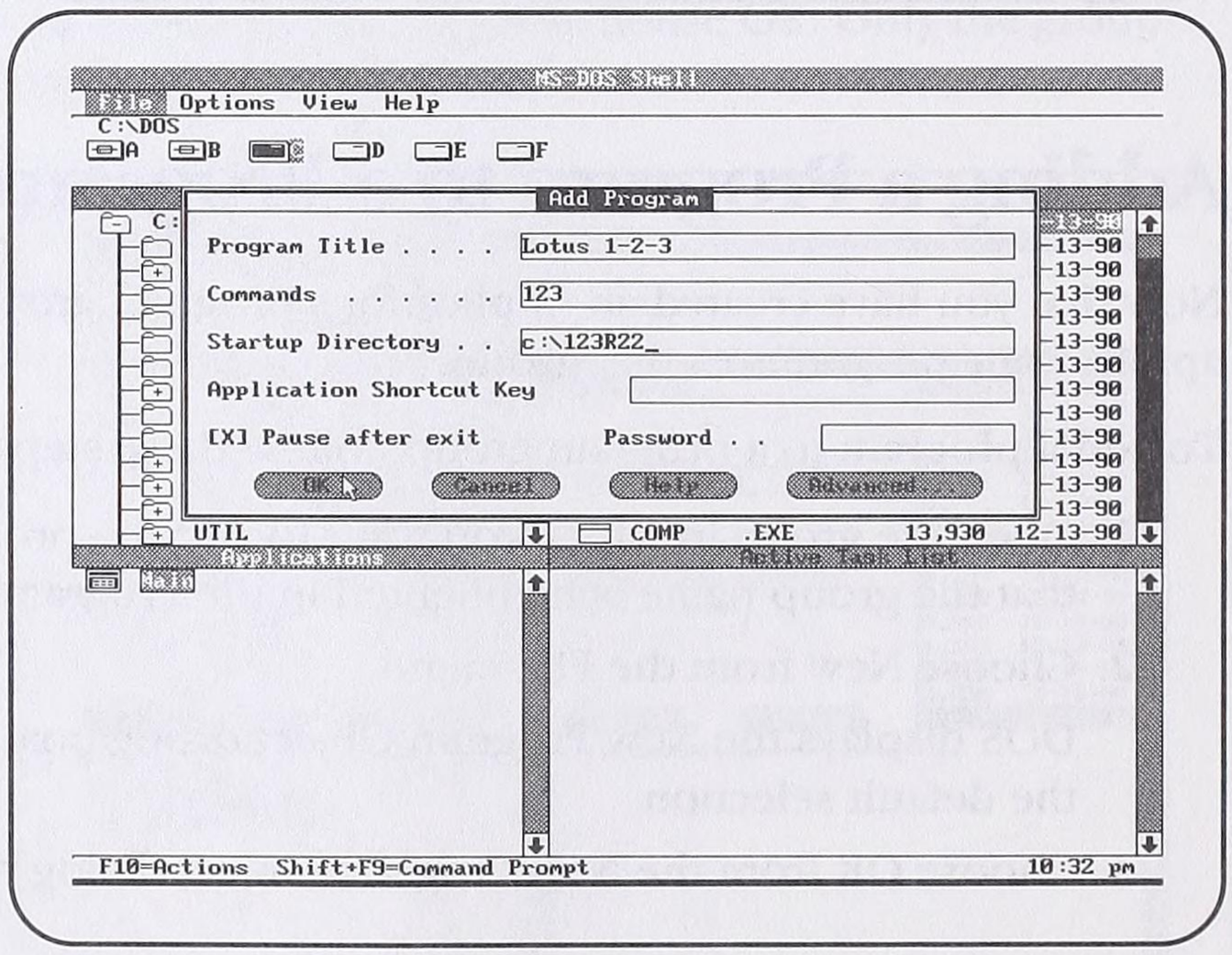
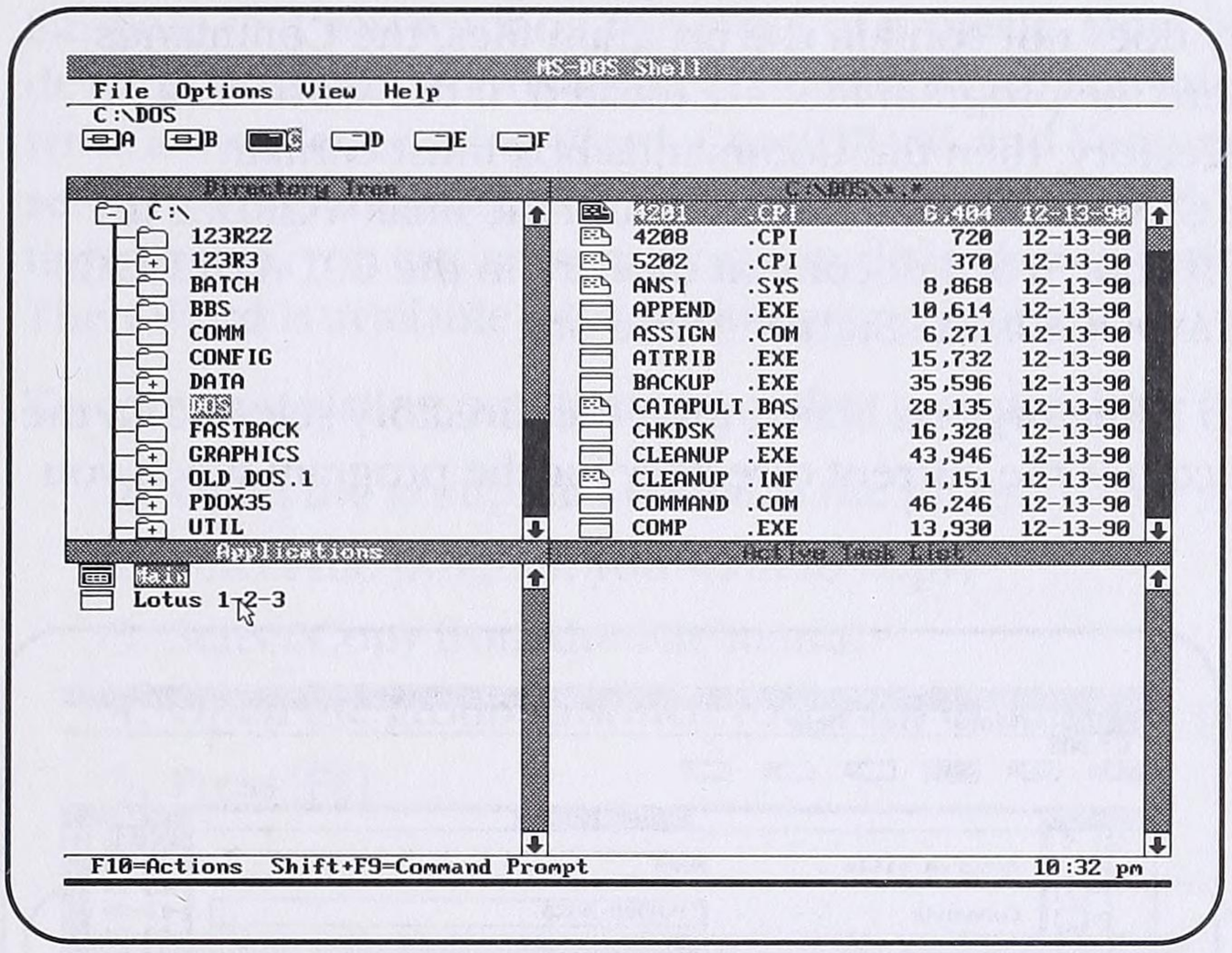
Enter in the Program Title box the name that you want to appear in the Program area with a program icon. Enter in the Commands box the name of the program that you want to execute. Enter in the Startup Directory box the directory that you want DOS to make current before it executes the program.





The new program title appears with an icon in the Applications program group.

Completing the Add Program Dialog Box

The Commands box in the Add Program dialog box can be confusing if you have never executed the program from the DOS prompt. When you install an applications program, the installation instructions tell you what to type in order to execute the program. Usually, you type the name of the program: to run Lotus 1-2-3, you type 123, to run Microsoft Word, you type WORD, and to run Fastback, you type FB.

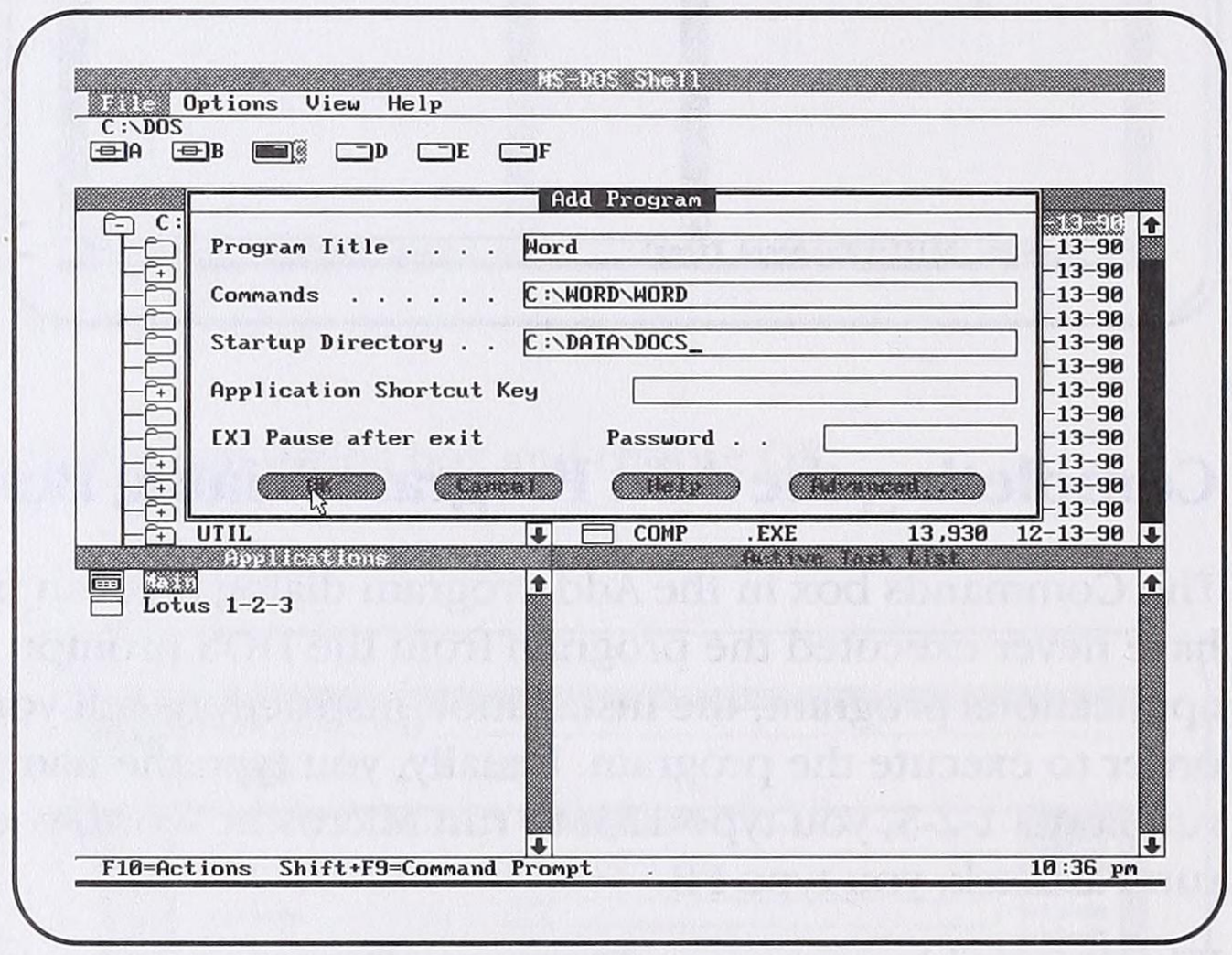
Whether and how you use the Startup Directory depends on how the program works. With some programs, such as Lotus 1-2-3, you must make the directory that contains the program files the current directory when you start the program. 1-2-3 then reads a configuration file to determine the default directory in which the 1-2-3 worksheet files are located. If, for example, your 1-2-3 files are in the C:\LOTUS directory, then you must make C:\LOTUS the startup directory, but if your 1-2-3 files are in the C:\123R22 directory (for 1-2-3, Release 2.2), then you must make C:\123R22 the startup directory.

When you enter a program name in the Commands box, DOS checks the current directory for the program. For 1-2-3, the program files are in the current directory, so DOS executes the program with no problem. For some other programs (such as Word and other Microsoft programs) the program files do not have to be in the current directory. For example, you can start Word from any directory, and the the default directory in which the Word document files are located is the current directory. In this case, you enter the WORD data directory in the Startup Directory box.

If the Startup Directory does not contain the program files, the Commands box must tell DOS where the program files are located. If the Word files are in the C:\WORD directory, then the Commands box must contain C:\WORD\WORD. The C:\WORD\ is the directory and the final WORD is the name of the program. If your Word document files are in the C:\DATA\DOCS directory, then C:\DATA\DOCS is the Startup Directory.

If you leave the Startup Directory box blank, then the directory selected in the Directory Tree area becomes the current directory for the program when you start that program.

If the Startup Directory is the data directory, the Commands box must contain the complete path to the application program.



If you include a password, you must enter the password each time you execute the program.

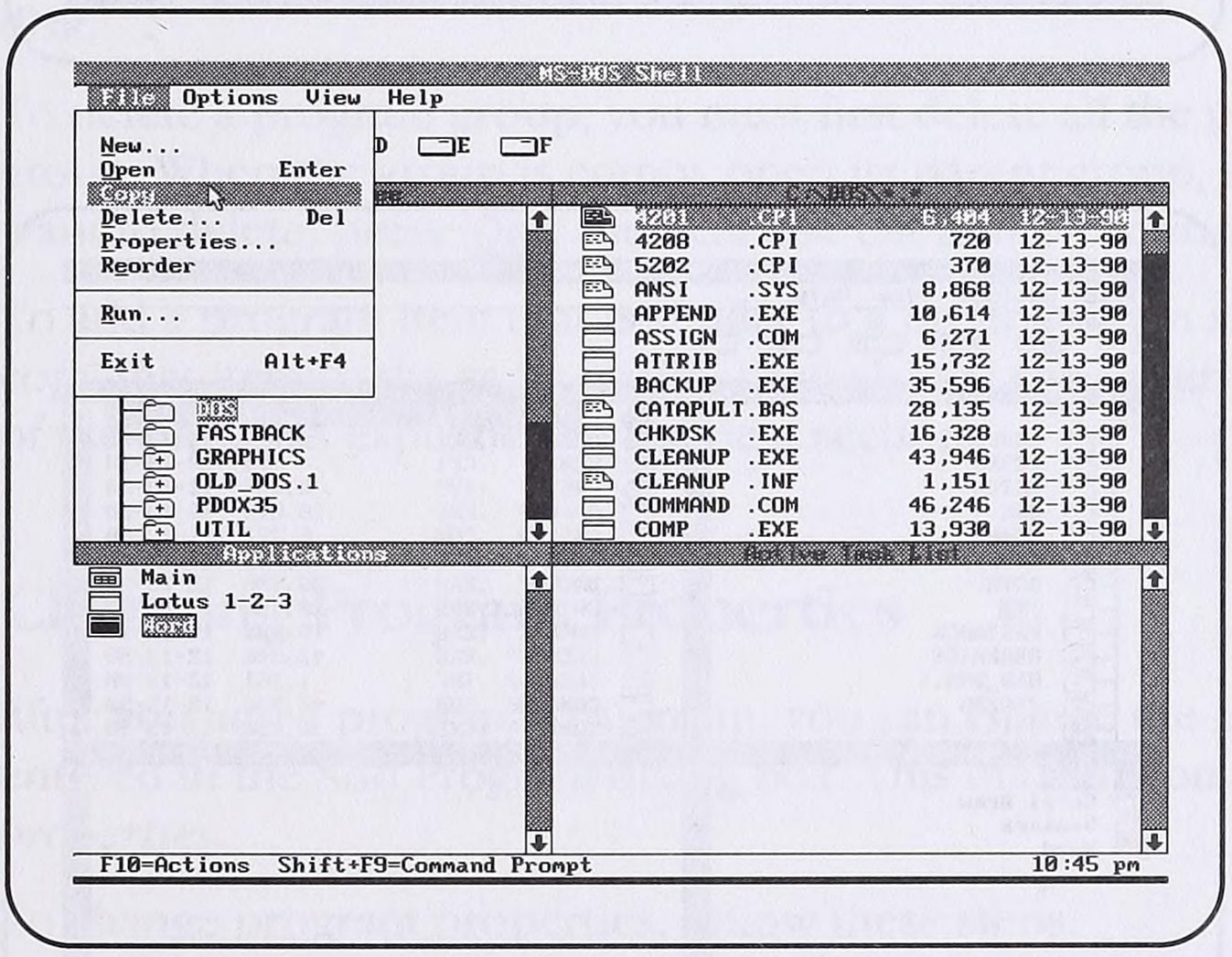
Copying a Program to a Program Group

After you define a program, you can copy the program definition to other groups. Why put a program in more than one group? By copying the program, you can run it from more than one group.

Suppose that you work on two types of projects. Most of the time, you develop financial reports using 1-2-3 and Word. For your other projects, you write a newsletter using Word, CorelDRAW, and Ventura Publisher. You can set up a program group for each project. After you add Word to the Applications group, you can copy its program definition to the Newsletter group. Then Word is available when either group is open.

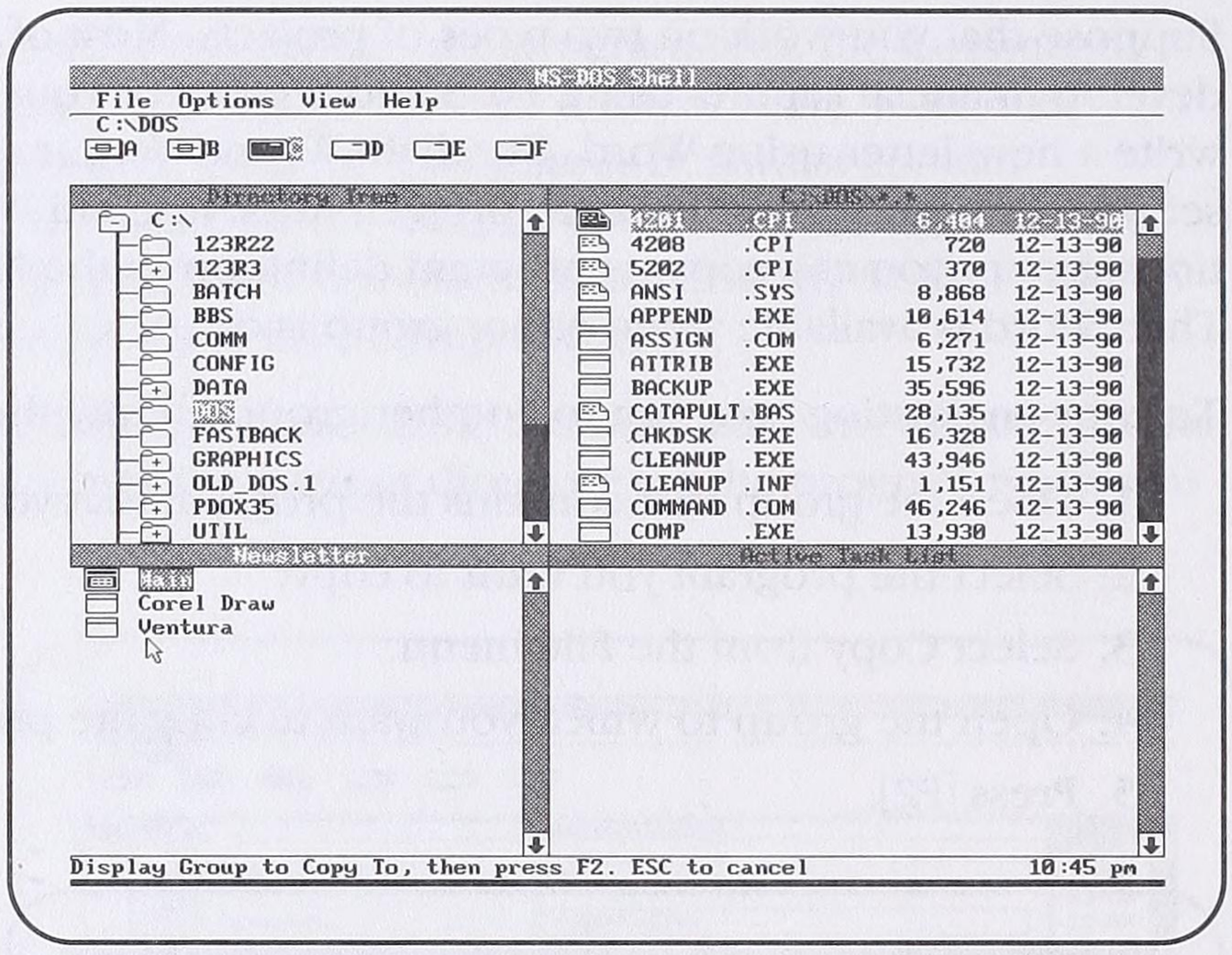
To copy an existing program to another group, follow these steps:

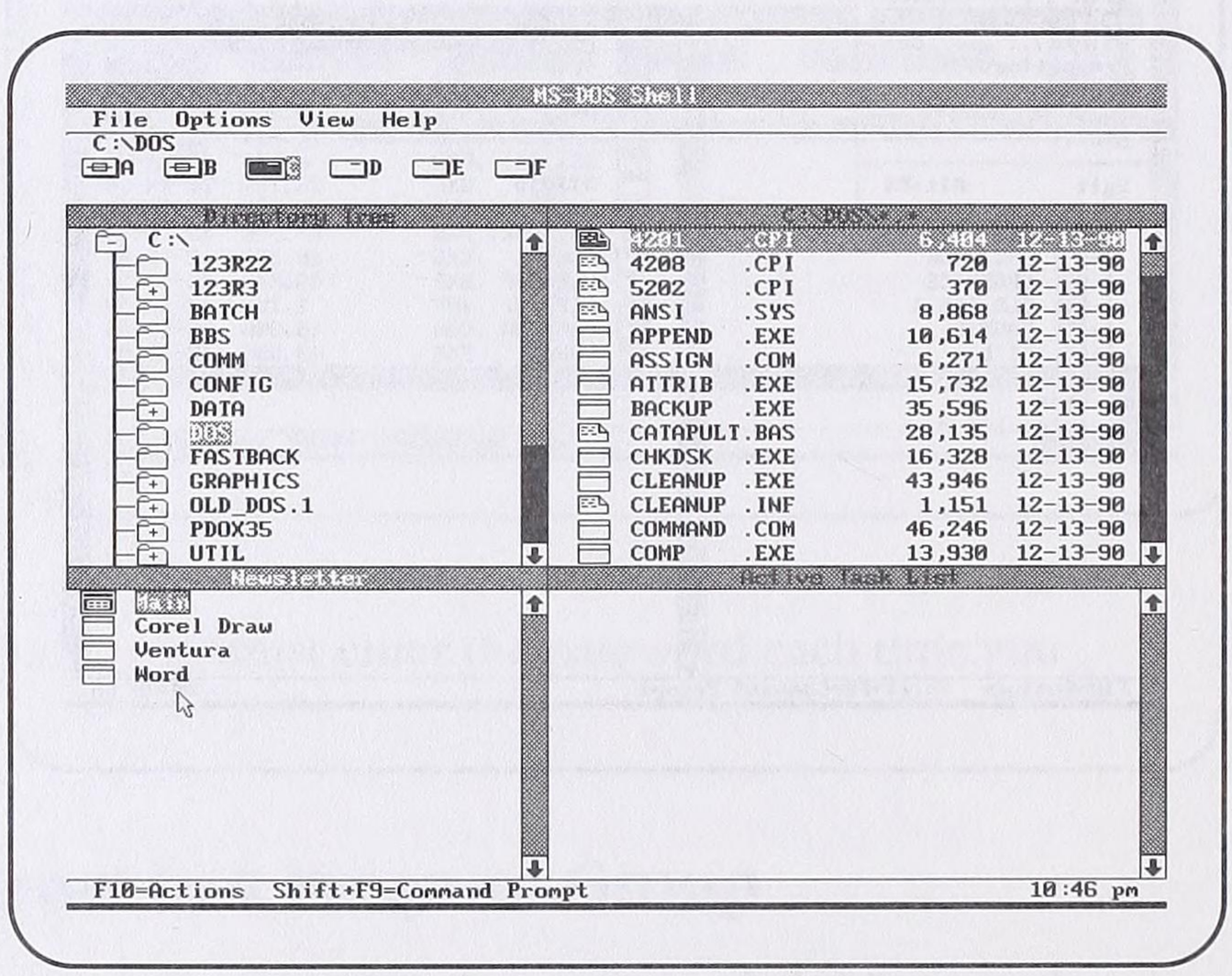
1. Open the group that contains the program that you want to copy.
2. Select the program you want to copy.
3. Select Copy from the File menu.
4. Open the group to which you want to copy the program.
5. Press F2.



Highlight the program that you want to copy and select Copy from the File menu.

Open the group to which you want to copy the program and press F2.





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When you copy a program to another group, you do not copy the program files; instead, you copy the information in the Add Program dialog box that tells DOS how to execute the program.

Maintaining Program and Group Information

After you create program groups and add programs to the groups, you can change information about groups and programs.

To move a program or group title within a group, follow these steps:

1. Select the program or group.
2. Choose Reorder from the File menu.
3. With the mouse, double-click the new location. With the keyboard, select the new location and press ↵Enter.

To delete a program from a group, select the program and press Del, then choose OK in the confirmation dialog box. The program files remain on the disk.

To delete a program group, you must first delete all the programs in that group. When the group is empty, open its parent group, select the group you want to delete, press Del, then choose OK in the confirmation dialog box.

To add a program item that is similar to a program item already in the group, copy that item to the same group, then change the program properties of one of the copies as explained in the next section.

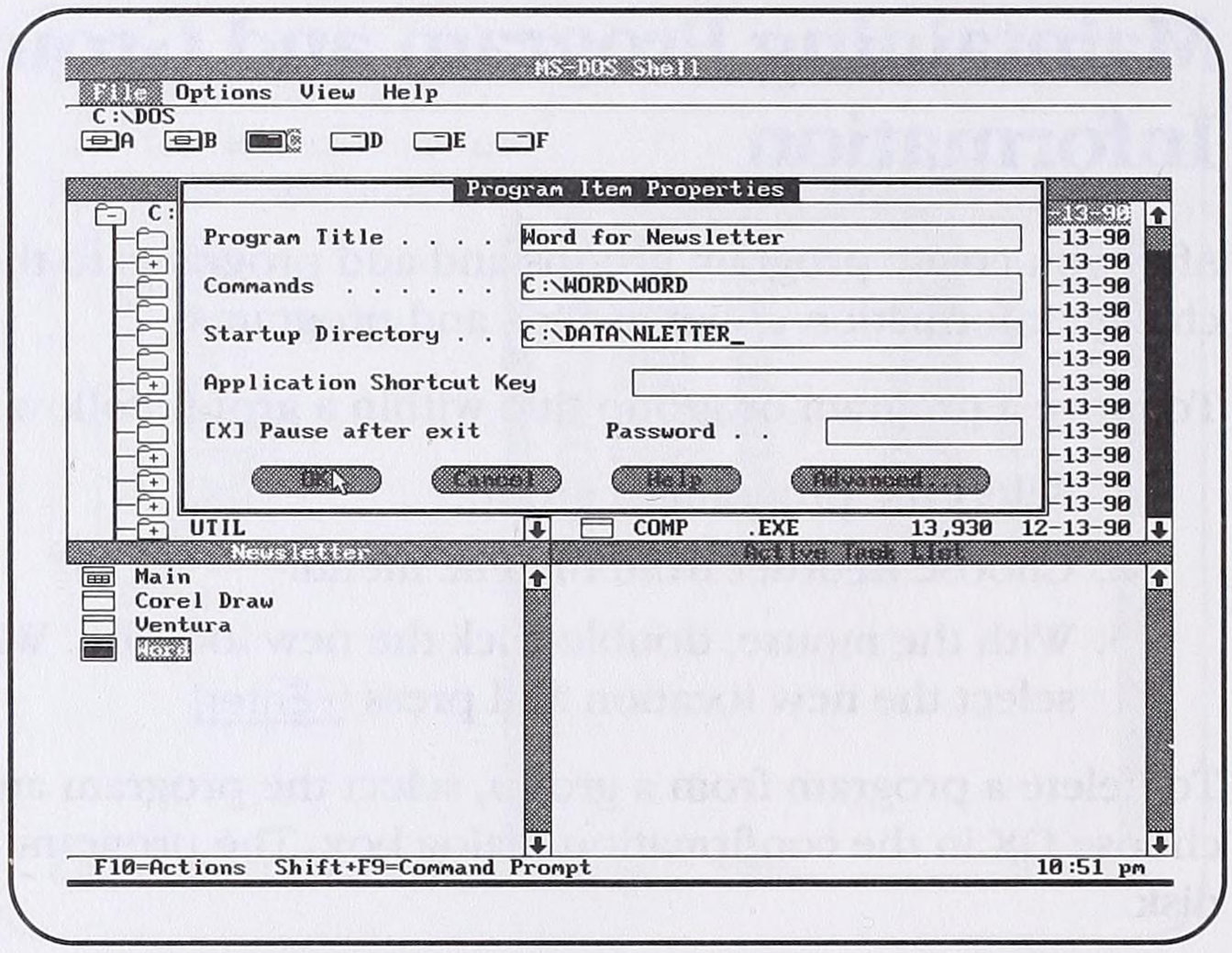
Changing Program Properties

After you add a program to a group, you can change the information that you entered in the Add Program dialog box. This information is called the program *properties*.

To change program properties, follow these steps:

1. Open the group that contains the program that you want to change.
2. Select the program that you want to change.
3. Select Properties from the File menu.
4. Complete the Program Item Properties dialog box and choose OK.

You can change the title and change the startup directory to the appropriate data directory. You can create many program items that run WORD, each with a different title (so you can tell them apart) and a different startup directory.



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Running Programs

You can run programs from the Shell in many ways, but the easiest way is to run programs from program groups.

After you build program groups and add programs to those groups, you can execute applications programs the same way you execute DOS utilities in the Main and Disk Utilities groups:

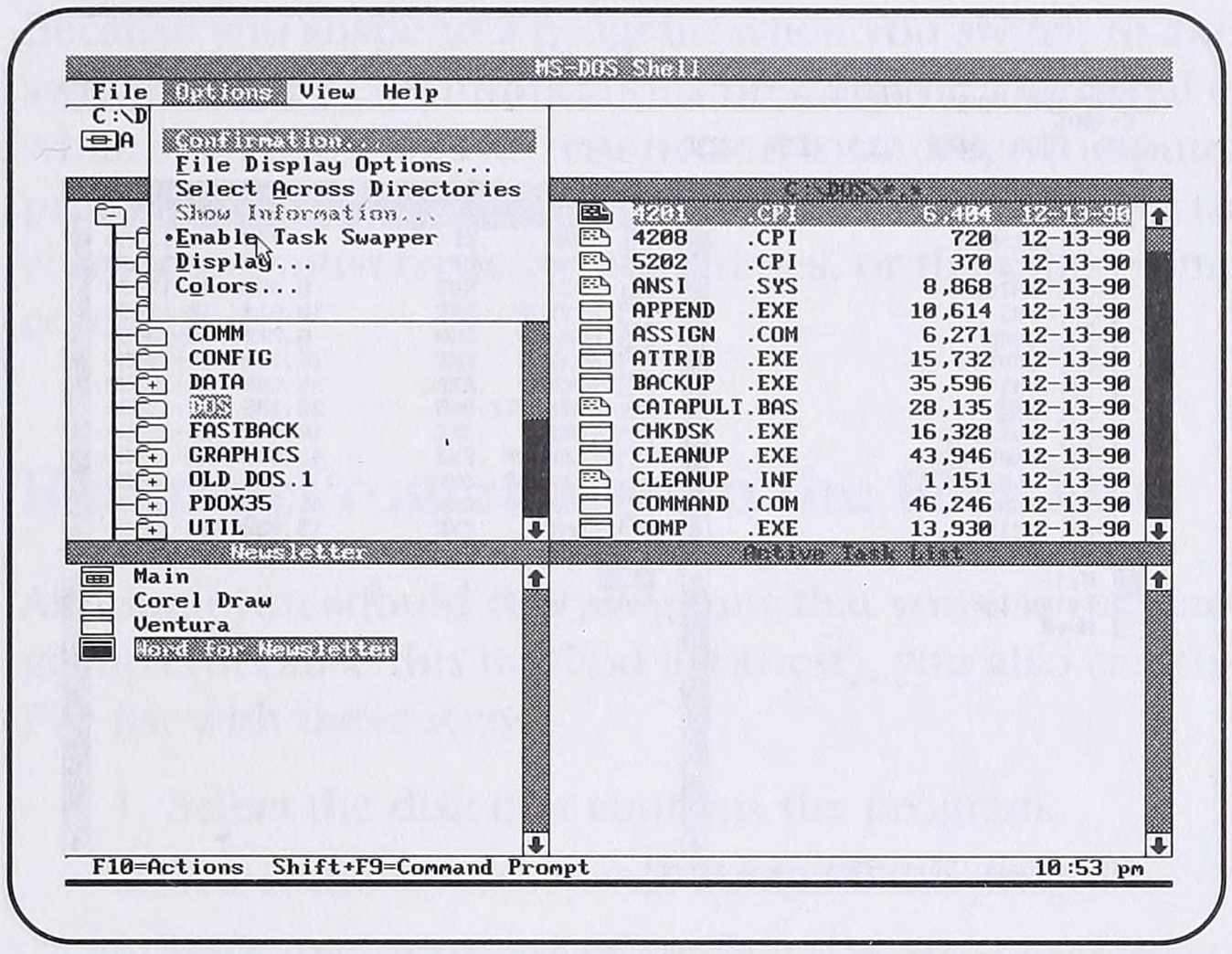
1. Open the group that contains the program that you want to execute.
2. With the mouse, double-click the program. With the keyboard, select the program and press ↵Enter.

After you run the program and quit or exit the program, you return to the Shell.

If you did not specify a Startup Directory for the program, highlight the disk and directory that you want the program to use as the current directory before you execute the program.

Using the Task Swapper

In Chapter 4, you had a glimpse of the Task Swapper. To enable the Task Swapper, choose Enable Task Swapper from the Options menu.



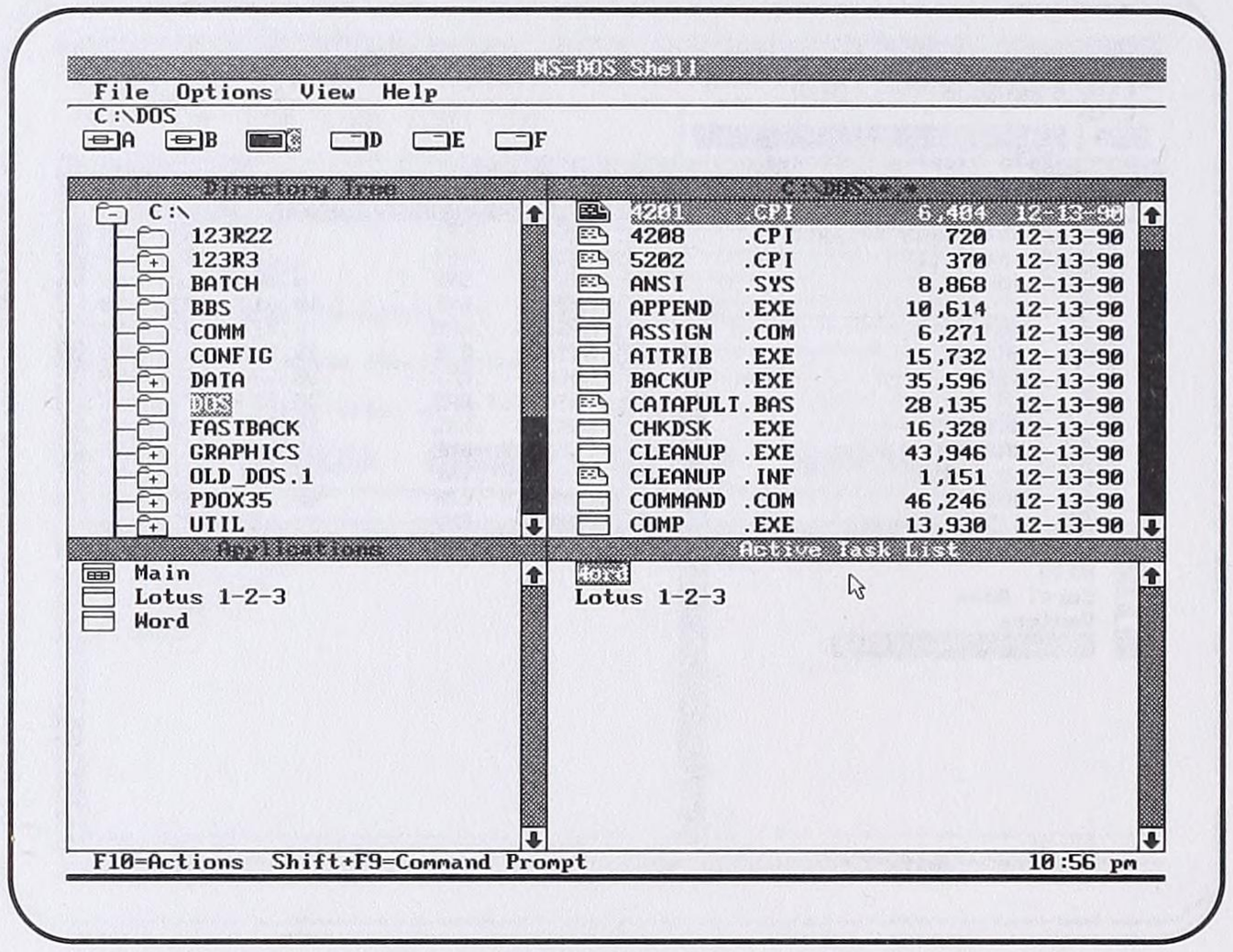
When the Task Swapper is enabled, the Active Task List shows any programs that are started and available.

The Task Swapper enables you to load multiple programs and "swap" among them with a keystroke. "Swapping" programs can be very handy if you regularly use more than one program at a time. If you use both 1-2-3 and Word to develop financial reports, for example, you can start both and swap between them in a few seconds. When you return to a program, the program is exactly the way you left it: the same files are loaded, the cursor is in the same position, and the same options are set.

You can use three key combinations to "swap" programs:

Ctrl-Esc	Returns to the Shell. If you are in the Shell, this key combination is ignored.
Alt-Tab ⇆	Switches to the preceding program, including the Shell. If you hold down Alt and press Tab ⇆ repeatedly, the top line of the display shows the name of each active task in reverse order of use. When the name of the program to which you want to switch appears, release Alt.
Alt-Esc	Switches to the next application in the Task List.

When you are in the Shell, the Active Task List shows the tasks in reverse order of use. The most recently used program (the program from which you switched to get to the Shell) is always at the top of the list.



The most recently used program is at the top of the Active Task List.

When you are in the Shell, you can switch to an active task the same way you start a program. With the mouse, double-click the program name in the Active Task List. With the keyboard, select the program in the Active Task List and press ↵Enter.

To remove a program from the Active Task list, switch to the program, save any files, and quit the program. You return to the Shell, and the program no longer appears in the Active Task List.

If a program "hangs" or freezes and you cannot quit the program, try to switch to the Shell using any of the three "swap" key combinations. If you can return to the Shell, follow these steps to cancel the program:

1. Select the program in the Active Task List.
2. Press the Del key.
3. Select OK in the confirmation dialog box.

Deleting the program from the Active Task List is not the normal way to quit a program and you can lose some data. Use this method to quit a program only if the program "hangs" and the only alternative is to boot your computer.

When you switch out of a program, the program is suspended. If you start a long recalculation in 1-2-3, then swap to another program, the recalculation resumes when you return to 1-2-3. 1-2-3 does not do any recalculation while suspended. In this sense, perhaps the name "Active Task List" is deceiving–only one task is really active at a time.

Because you suspend a program when you switch to another program, do not switch out of a communications program or a terminal emulation program while such programs are connected to another computer. When your computer is connected to another computer, the program that manages the connection must be active at all times, or the other computer may break the connection.

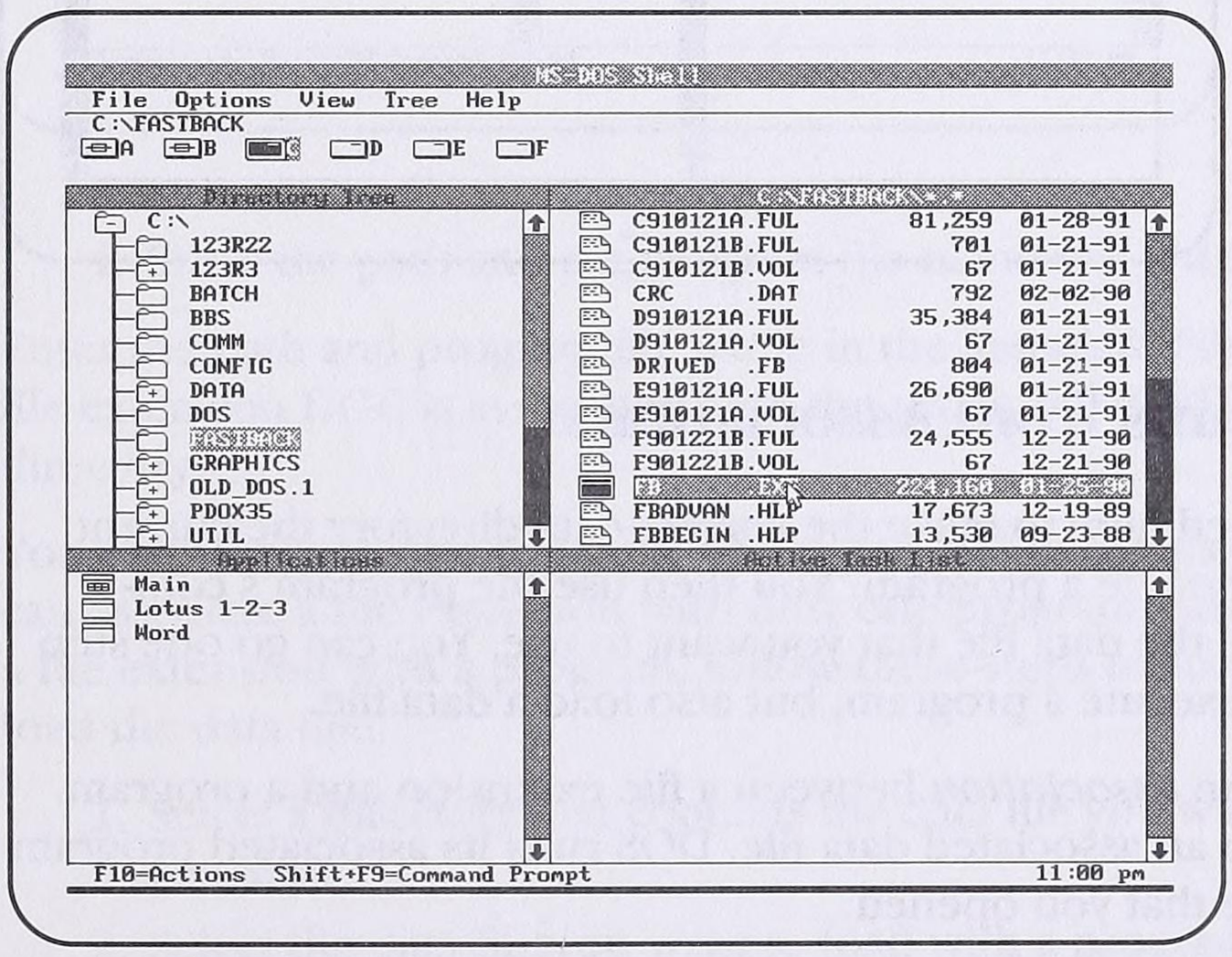
Running Programs from the Files List

Although you should run programs that you use regularly from program groups (because this method is easiest), you also can run programs from the File list with these steps:

1. Select the disk that contains the program.
2. Select the directory that contains the program.
3. With the mouse, double-click the program file name. With the keyboard, select the program file name and press ↵Enter.

   The program file name can have an EXE or COM file extension.

When you execute a program from the file list, the directory that contains the program is the current directory.

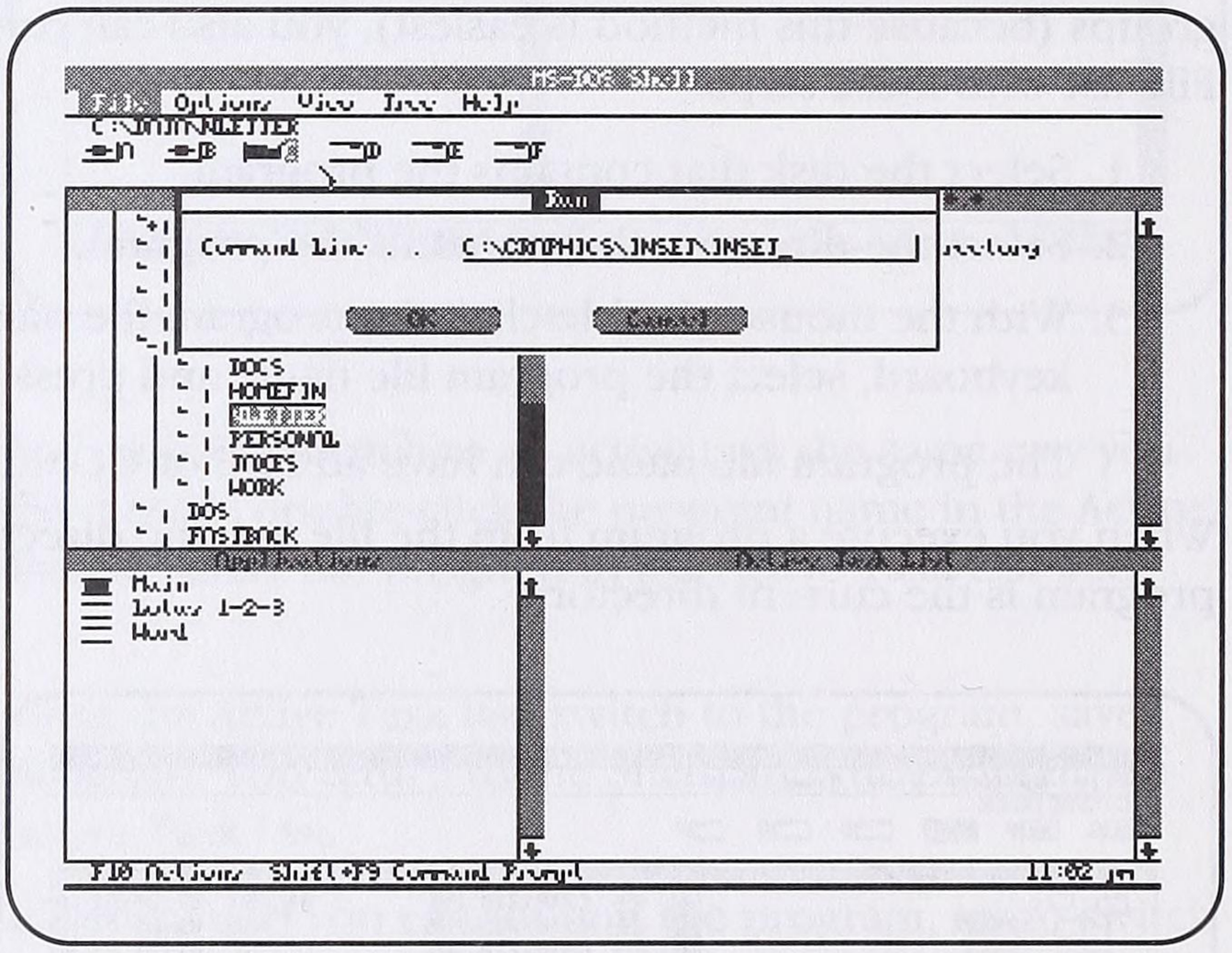


Double-click the program file name or select the program and press ↵Enter. Notice that the icon for a program is different from the icon for other types of files. You can execute only those files that have program icons.

Running Programs with the Run Command

Because the most difficult way to execute a program in the Shell is with the Run command, use the Run command only with programs that you rarely use. To execute a program with the Run command, follow these steps:

1. Select the disk and directory that you want to be current when the program executes.
2. Select **R**un from the File menu.
3. Type the path and the command to start the program.



You can execute any program with the Run command in the File menu. In most cases, you must provide the complete path to the program. The INSET program is in the C:\GRAPHICS\INSET directory.

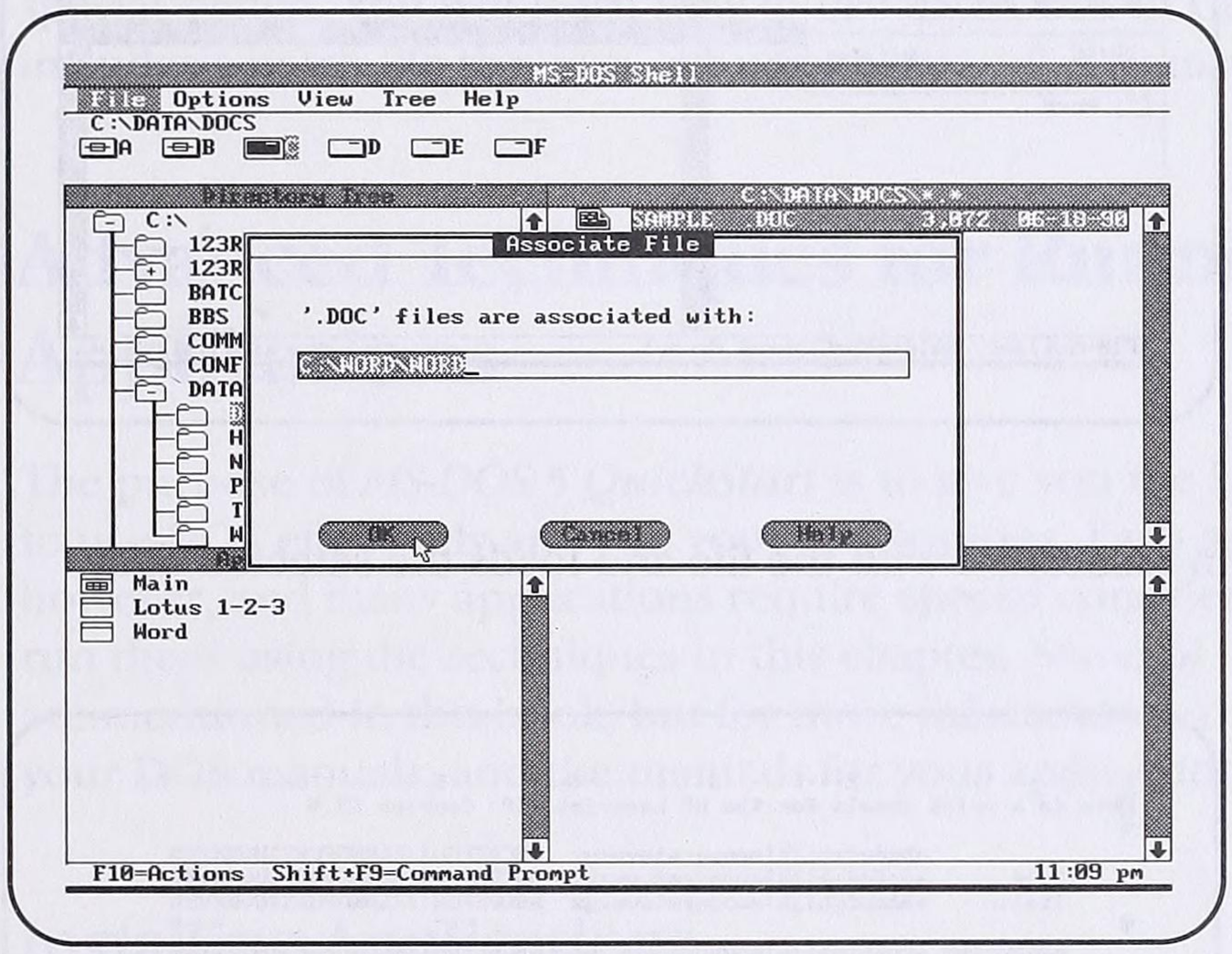
Running Programs from Associations

So far, you have learned how to make the correct data directory the current directory when you execute a program. You then use the program's commands to load or read the data file that you want to use. You can go one step further and not only execute a program, but also load a data file.

First, you must form an *association* between a file extension and a program. Then, when you open an associated data file, DOS runs its associated program and loads the data file that you opened.

To form an association between a file extension and a program, follow these steps:

1. Select a directory that contains a file with the extension that you want to associate with a program.
2. Select a file with the extension that you want to associate with a program.
3. Choose Associate from the File menu.



After you select a file with the extension that you want to associate with a program, choose Associate from the File menu. Files with the extension DOC are Microsoft Word files.

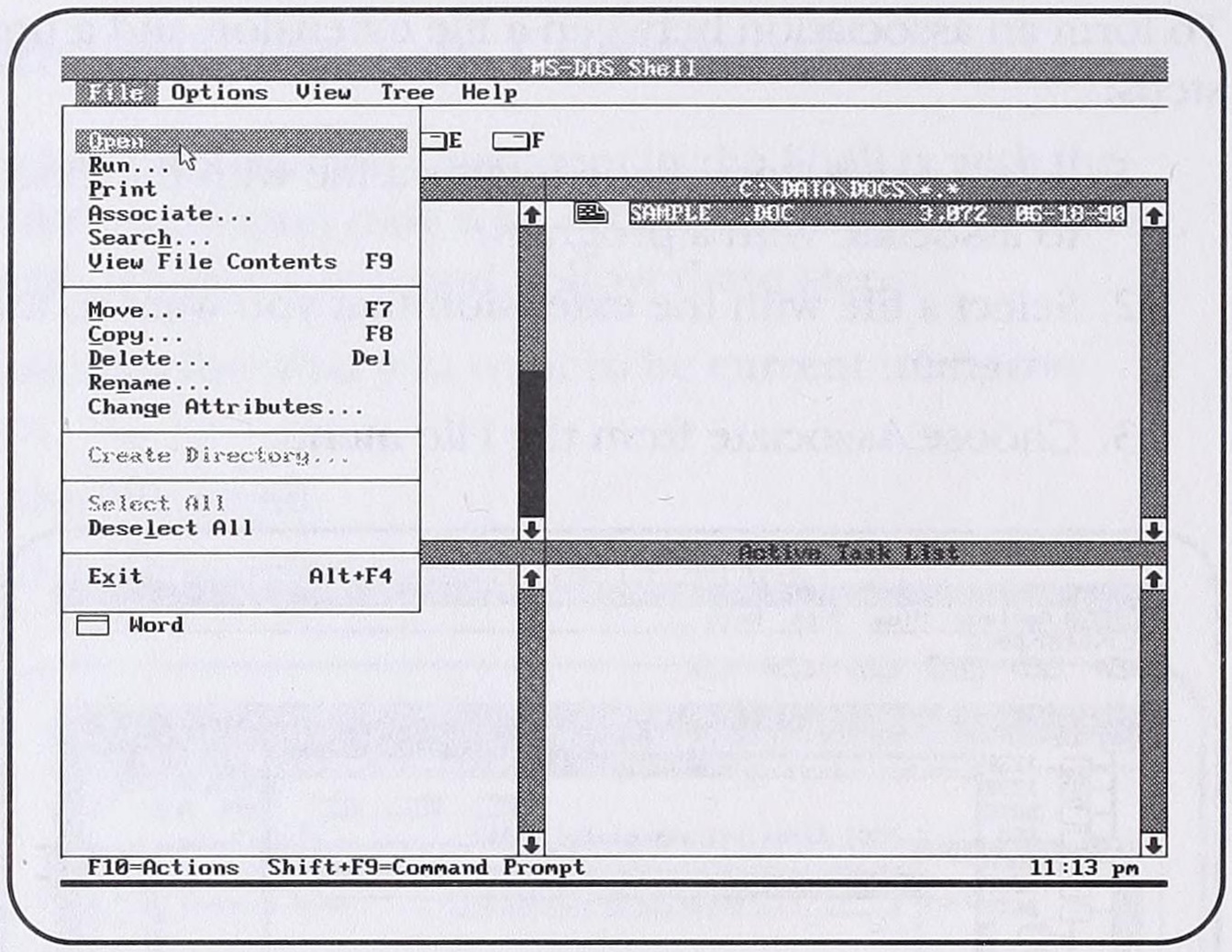
4. Enter the path and the program file name and choose OK.

Enter the path and program file name in the Associate File dialog box. The file extension DOC is associated with the program WORD in the C:\WORD directory.

You can associate one program with up to 20 file extensions, but you can associate a file extension with only one program. After you associate a file extension with a program, follow these steps to start the program and load the data file:

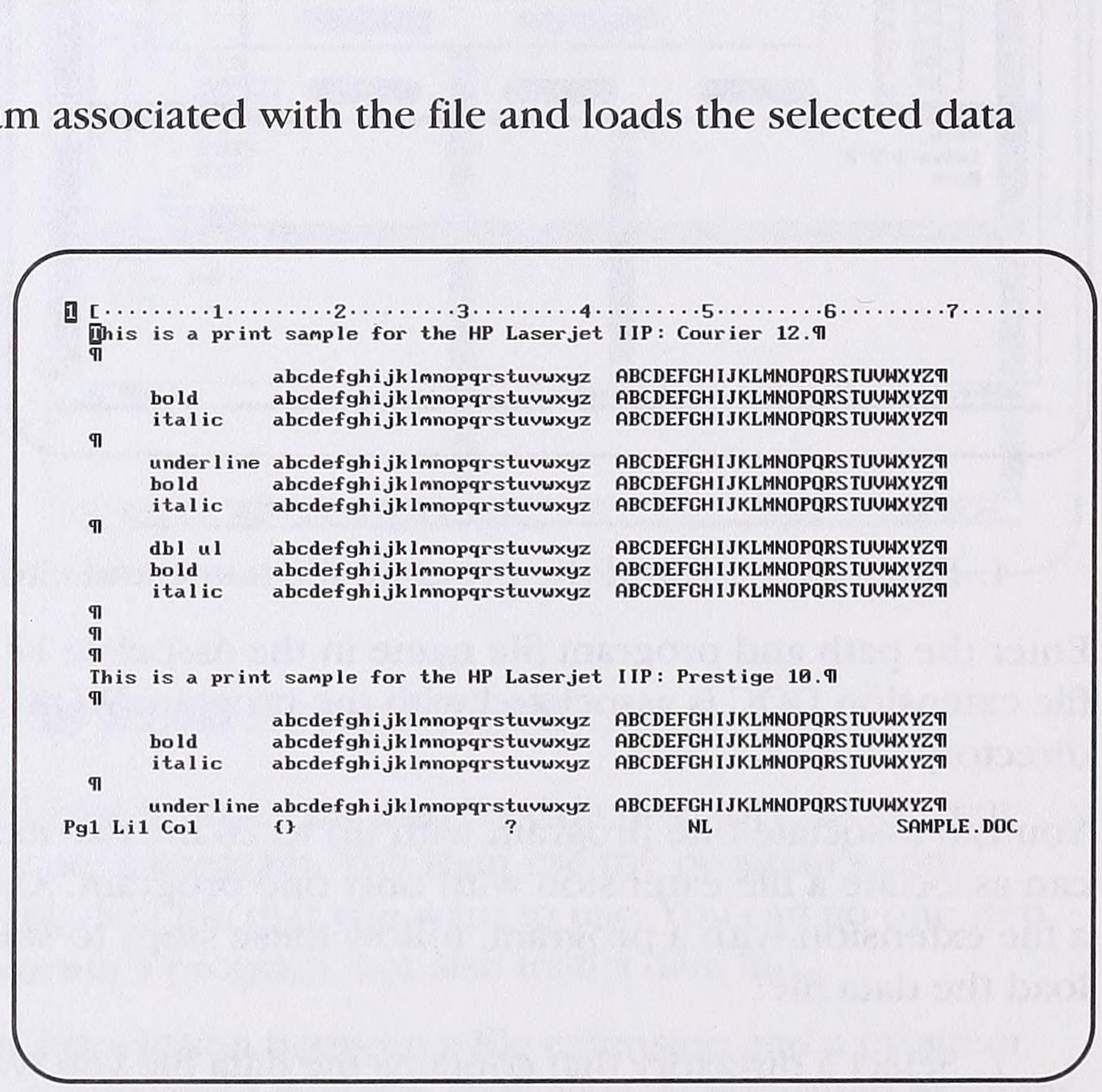
1. Select a directory that contains the data file you want to load with a program.
2. Select the data file you want to load with a program.
3. Choose Open from the File menu, press ↵Enter, or point to the data file with the mouse pointer and double-click.

The SAMPLE.DOC file in the C:\DATA\DOCS directory is selected. Because the DOC extension is associated with Microsoft Word, DOS starts WORD when you choose Open from the File menu.



DOS starts the program associated with the file and loads the selected data file.

DOS has started WORD and loaded the SAMPLE.DOC file.


This is a print sample for the HP Laserjet IIP: Courier 12.¶
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Pg1 Li1 Col {} ? NL SAMPLE.DOC

Loading a data file with this technique works only with certain programs. You must be able to run the program from any directory and you must be able to specify a data file name when you run the program. The technique does not

work with a program such as Lotus 1-2-3, Release 3.x because you cannot load a named data file when you start this program.

To load a data file when you open Lotus 1-2-3 Release 2.2, you must use a special *batch file*. The problem with a program such as 1-2-3 Release 2.2 is that you must start the program from the program directory. To start a program from an association, you start the program from the directory that contains the data file. The other problem with this technique is that you cannot just add a data file name when you start 1-2-3; you need to use a special switch. You will learn how to use batch files in Chapter 12, which includes a batch file that you can use to start 1-2-3 from a file association.

Advanced Techniques for Running Applications

The purpose of *MS-DOS 5 QuickStart* is to give you the knowledge and skills to use DOS effectively and run your applications. Each application is different, however, and many applications require special considerations before you can run them using the techniques in this chapter. Some of these consideration are mentioned in this book, but for more information, consult *Using DOS*, your DOS manuals, and the manuals for your application programs.

Installing Applications

Before you buy a program, investigate its hardware requirements. The program may require a certain type of monitor, such as an EGA or VGA monitor. You may need a certain amount of memory in your computer. Some programs are difficult to use without a mouse. Many applications require more than a megabyte of disk space and require a hard disk. Make sure that you have the appropriate hardware to run the program.

Some programs also have software requirements. Many new programs, such as Microsoft Excel, require Windows. Some programs require certain versions of DOS, or run only with a certain network operating system, such as Novell Netware. Make sure that you have the appropriate software to run the program.

Most applications have an *install* or *setup* procedure that you must execute before you can use the program. Read the entire installation procedure before you do anything. In some cases, you must create a directory before you start

the installation; in others, the installation procedure creates the directory for you. In some cases, you have a choice of the directory name; in others you must install the program in a specific directory.

The installation procedure for most programs tells you what DOS commands to run to prepare for the installation. These instructions probably use the DOS command line, which is discussed in the next chapter. You also can use the Shell to create directories and copy files rather than using the command line.

Some installation programs run incorrectly if executed from the Shell. If the installation does not run correctly, press F3 to cancel the Shell and run the installation program from the command line.

Completing the Commands Box in the Program Properties Dialog Box

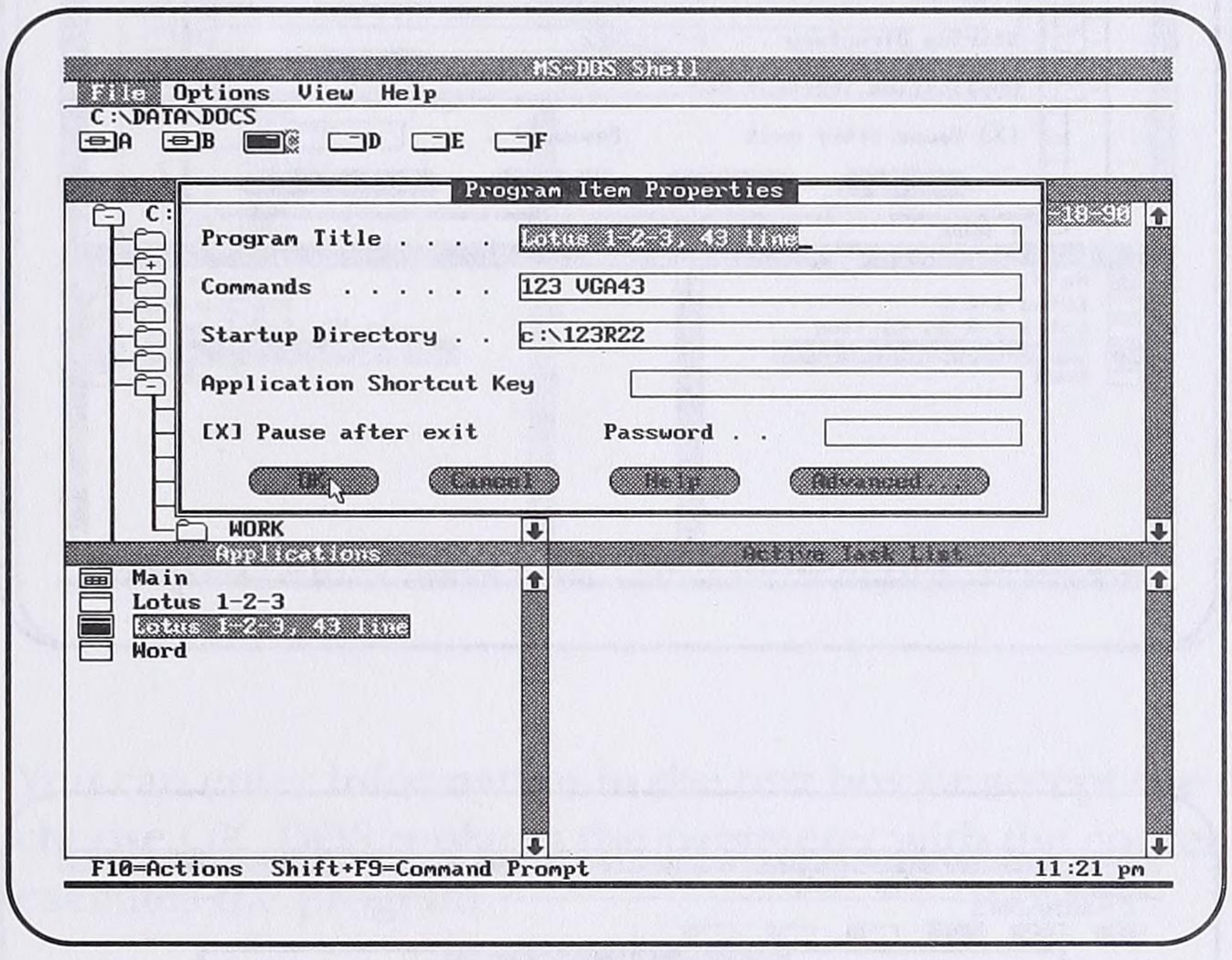
After telling you how to install the program on your hard disk, the manual tells you how to execute the program. If the manual states that you must make the program directory the current directory, then you must use the program directory as the Startup Directory when you add the program to a program group. You must use this technique when you add Lotus 1-2-3 to a program group.

Often you can enter just the program name to start the program. If so, enter the program name in the Commands box when you create the program item in a program group. For Microsoft Word, you enter **WORD**. For 1-2-3, you enter **123**.

In some cases, you can or must enter additional *parameters* when you start the program. A parameter is any additional information that tells the program what to do when it runs. To start some versions of WordPerfect and load the entire program into memory, the command is **WP/R**. With 1-2-3, you can use alternate screen settings with most monitors; if you have a settings file named VGA43 to display 43 lines, you can tell 1-2-3 to use this settings file with the command **123 VGA43**.

If you want to include a parameter when you start a program, add the parameter to the Commands box when you create the program item in a program group. For WordPerfect, enter **WP/R**. For 1-2-3 with a 43-line settings file, enter **123 VGA43**.

Within a program group, you can have several similar program items that have different parameters in their Commands boxes. For example, you can have a 1-2-3 program item that starts 1-2-3 with a 25-line display and another 1-2-3 program item that starts 1-2-3 with a 43-line display.



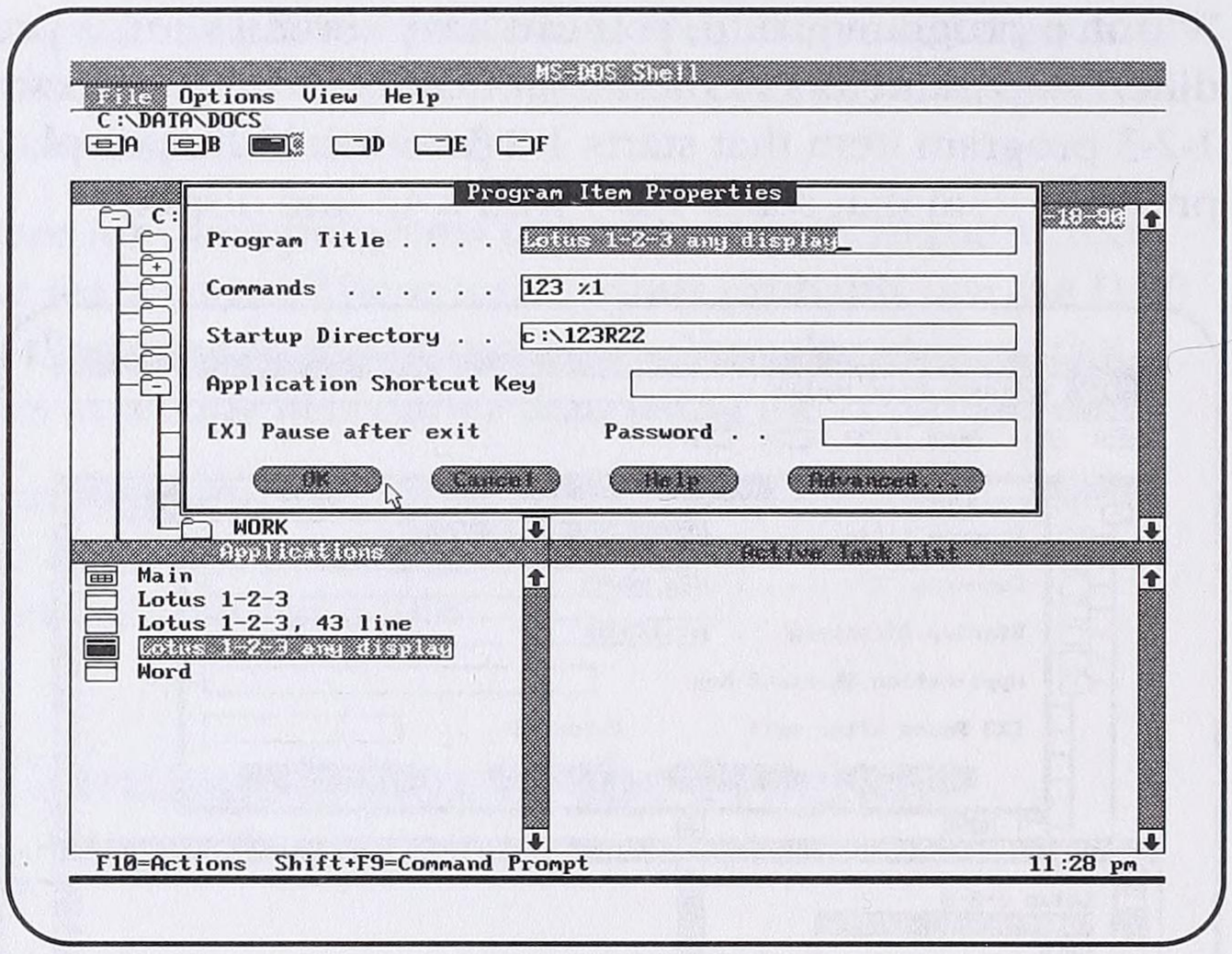
You can include a program several times in one group with different parameters. The optional parameter in the Commands box is for the 43-line display.

Using Replaceable Parameters in a Commands Box

Some programs enable you to use many different parameters when you start the program. You can set up a separate program item for each combination of parameters that you might use or you can use *replaceable parameters.* A replaceable parameter is a parameter that you specify when you run the program, rather than when you fill in the Commands box.

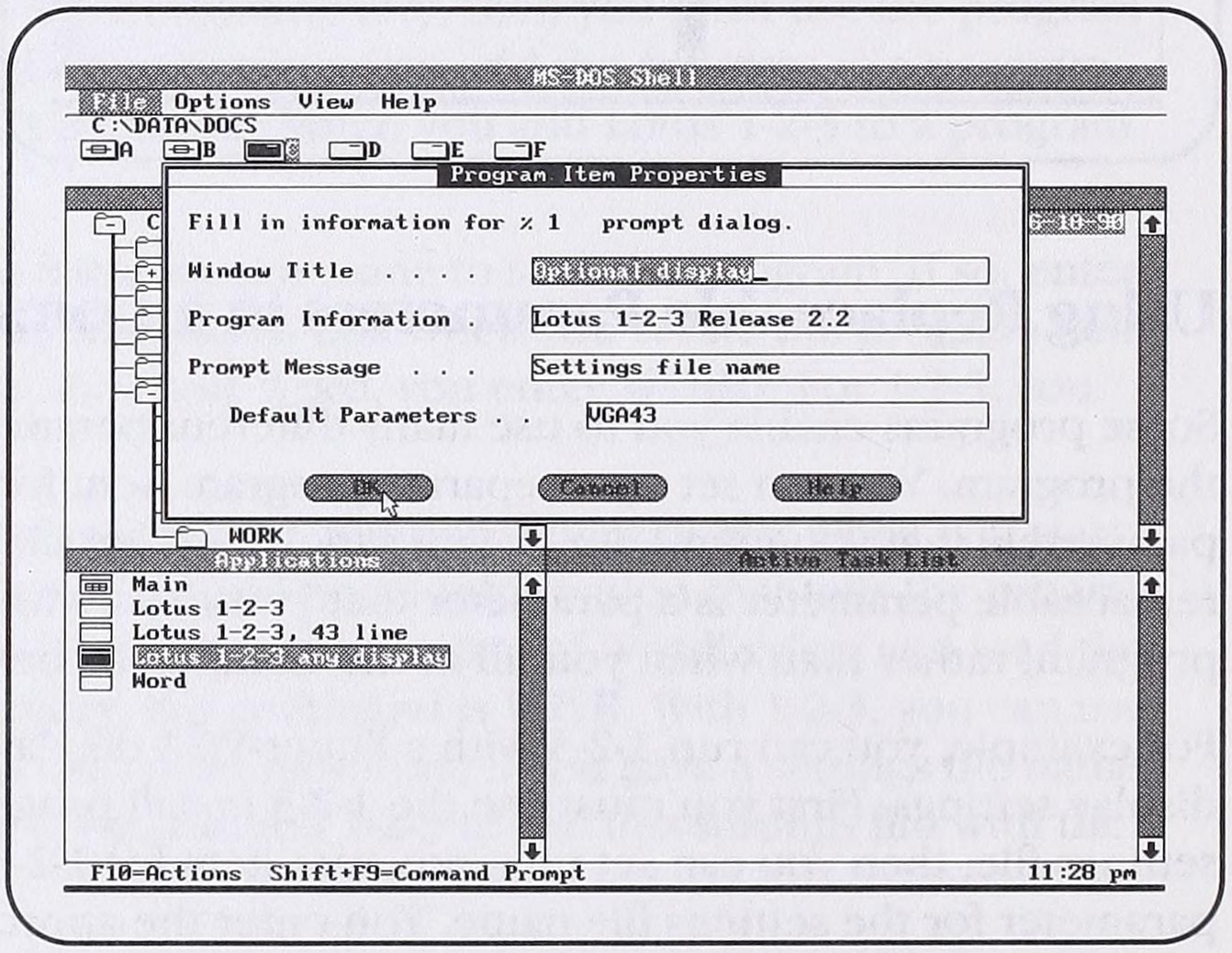
For example, you can run 1-2-3 with a Super-VGA display using many different display settings. First you must use the 1-2-3 install program to create each settings file; then you can set up a program item for 1-2-3 with a replaceable parameter for the settings file name. You enter the appropriate settings file name each time you run 1-2-3.

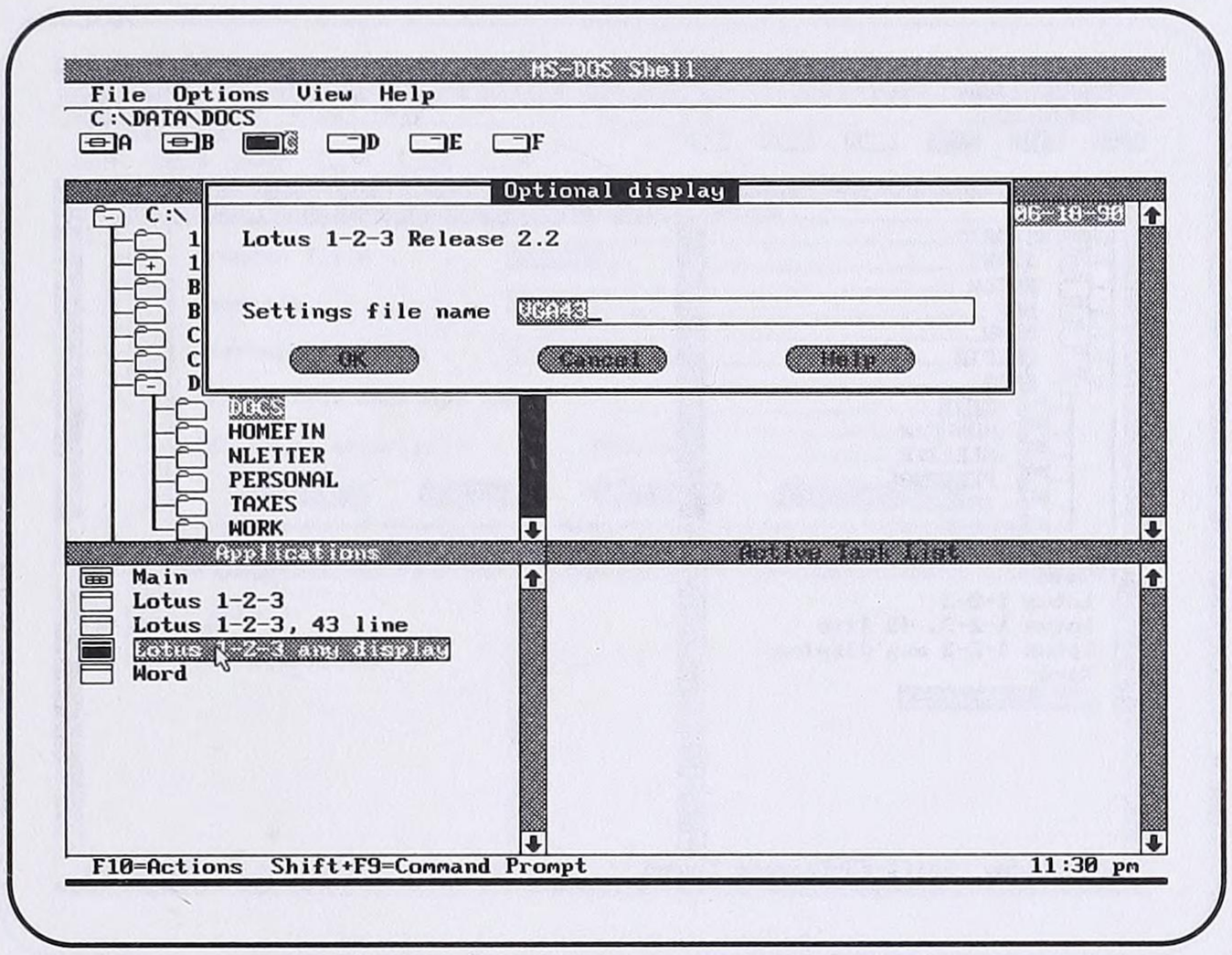
To specify a replaceable parameter, enter a percent sign (%) followed by a single-digit number (1-9). A single replaceable parameter is usually specified as %1.



8

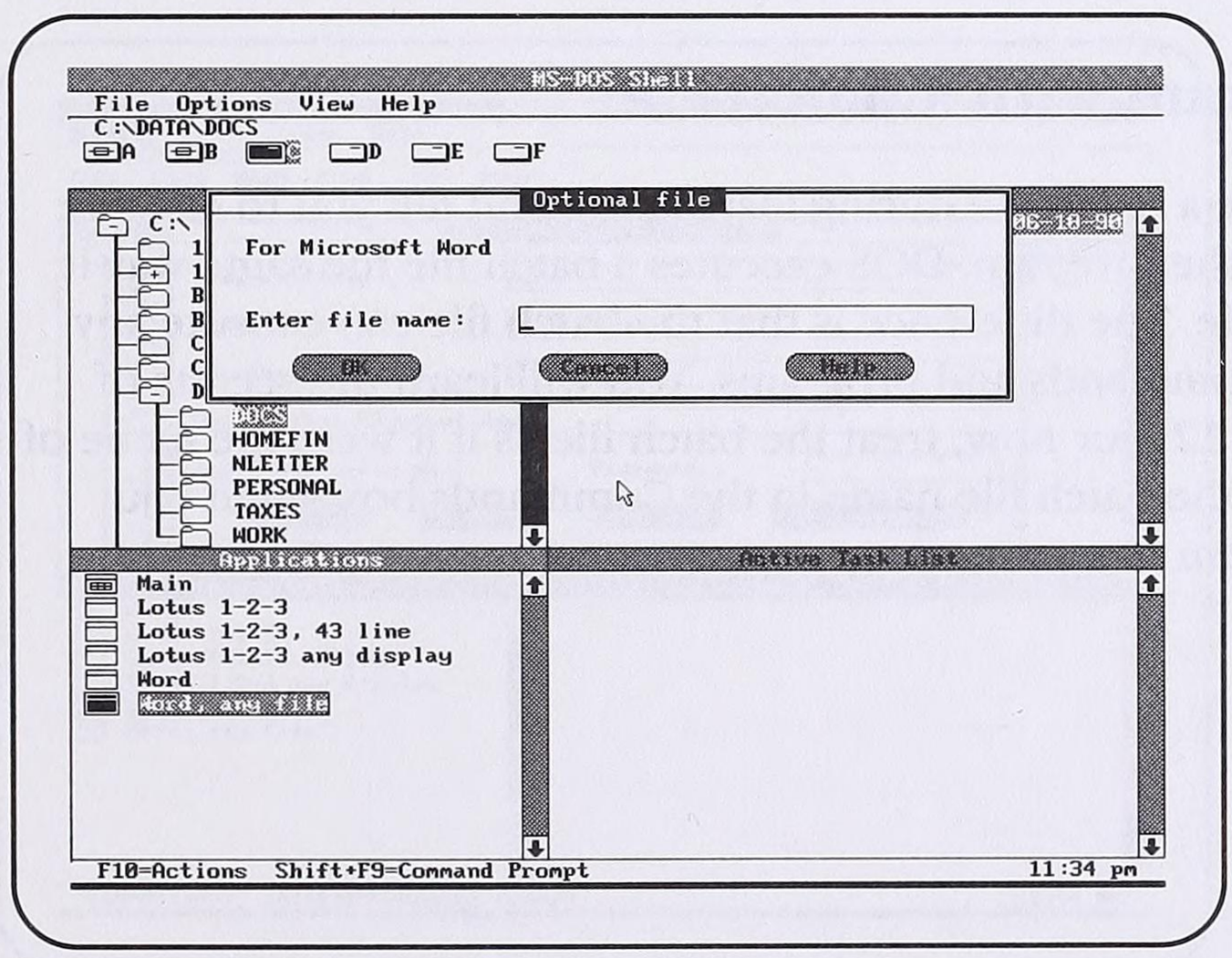
When you enter a replaceable parameter in the Commands box and choose OK, DOS displays the Program Item Properties dialog box. All of this information is optional.





When you run a program with a replaceable parameter, DOS displays the information dialog box before executing the program.

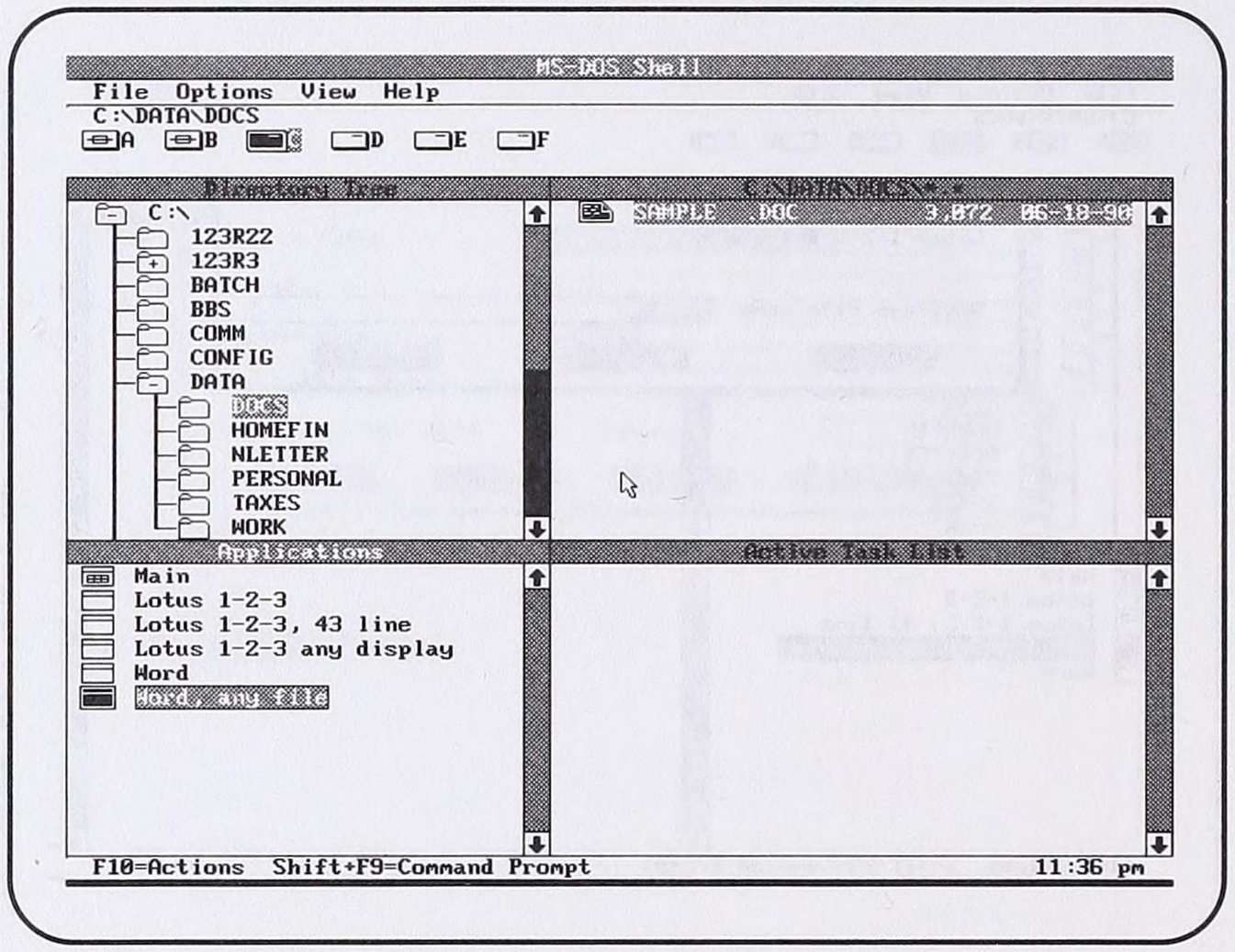
You can enter information in the text box or accept the default. When you choose OK, DOS replaces the parameter with the contents of the text box and executes the program.



If the data file is not in the current directory, you must include the path. No default data file name was specified, so the text box is blank.

If you use more than one replaceable parameter, call the parameters %1, %2, etc. Complete a separate dialog box for each replaceable parameter.

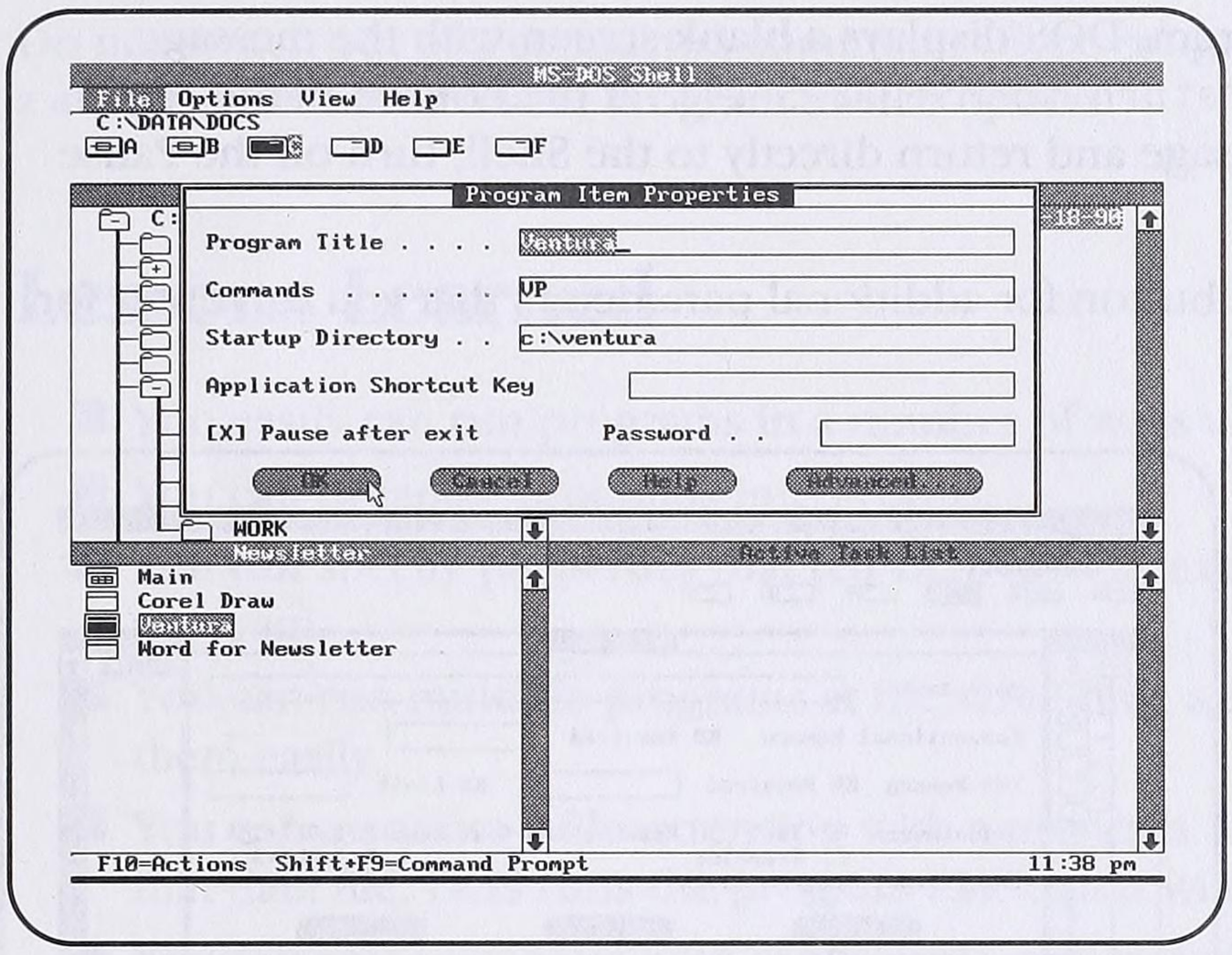
When you use replaceable parameters, you often want to have another version of the program without replaceable parameters in the same program group.



Select the program without replaceable parameters if the parameters are not needed. You then bypass the information dialog box and go directly to the program.

Starting a Program with a Batch File

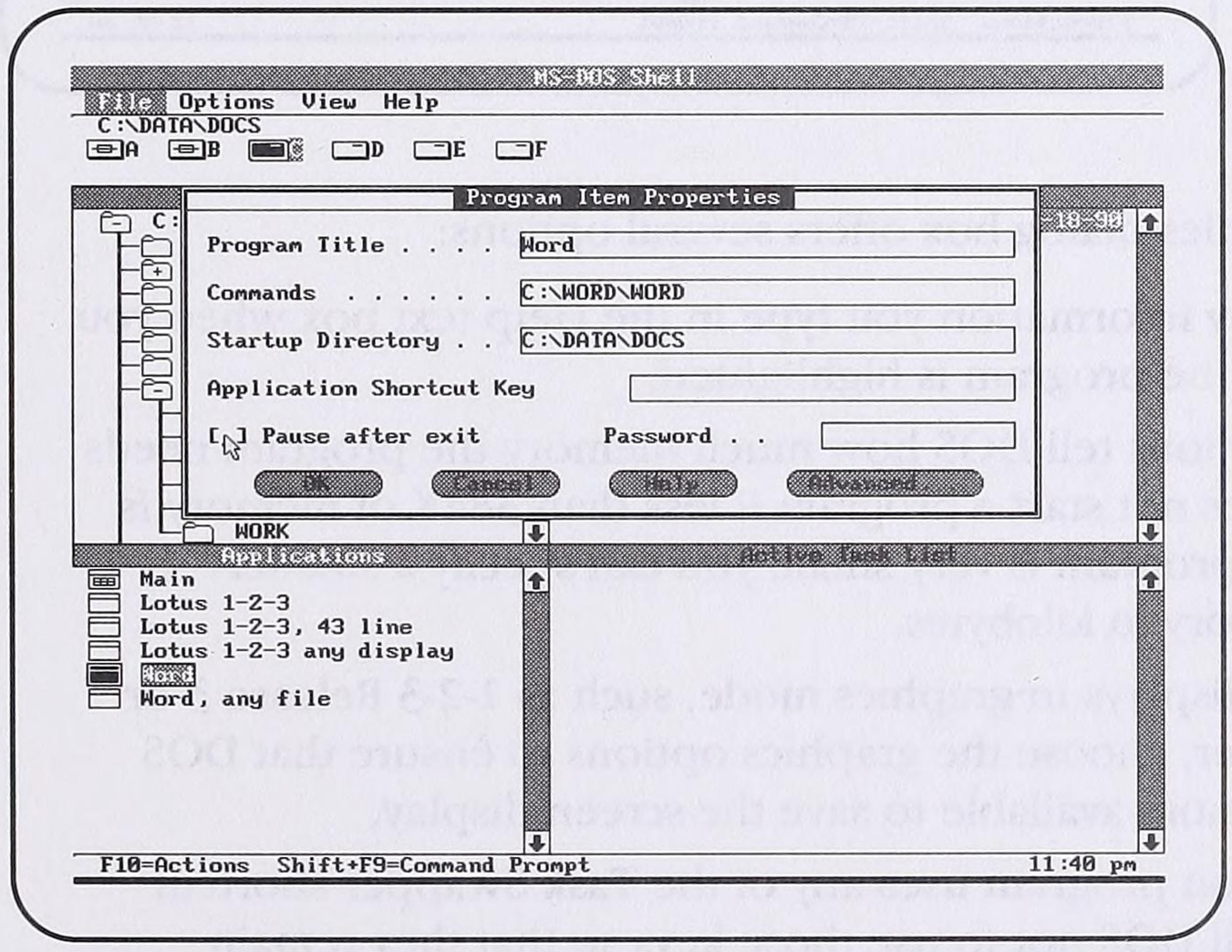
Some programs create a batch file during installation and tell you to execute the batch file to start the program. DOS executes a batch file the same way it executes a program file. The difference is that the batch file can execute any number of separate commands and programs. You will learn the secrets of batch files in Chapter 12. For now, treat the batch file as if it were the name of the program and put the batch file name in the Commands box when you create the program item in a program group.



Ventura Publisher is a program that you must execute from the directory that contains the program files. The installation process creates a batch file named VP.BAT. The batch file then executes the Ventura Publisher program.

Other Program Properties

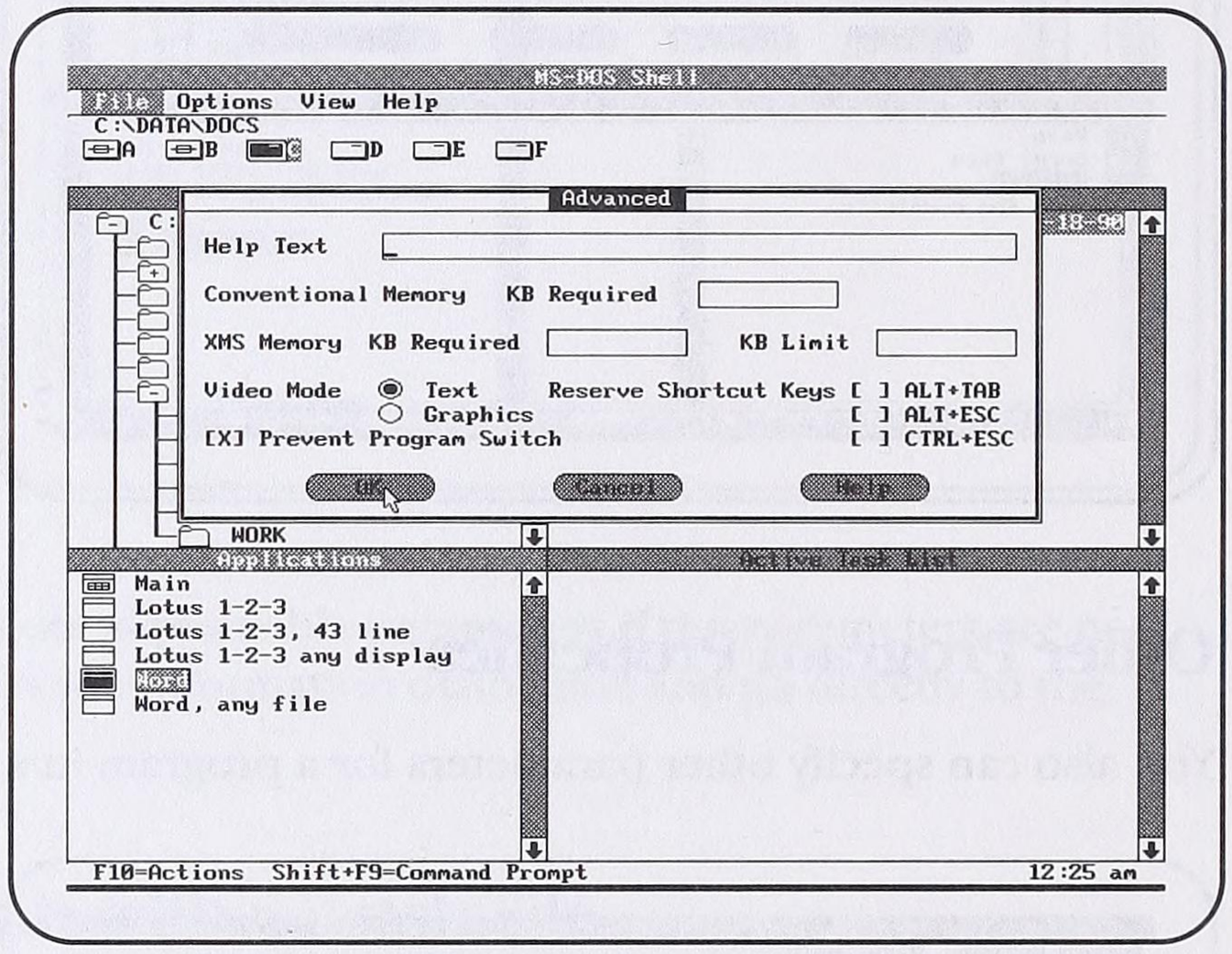
You also can specify other parameters for a program in a program group.



To eliminate the `Press any key to return to MS-DOS Shell` message and return directly to the Shell, turn off the Pause After Exit option. Choose the Advanced button for additional parameters.

When you exit a program, DOS displays a blank screen with the message `Press any key to return to MS-DOS Shell` at the bottom of the screen. To eliminate this message and return directly to the Shell, turn off the Pause After Exit option.

Choose the Advanced button for additional parameters that you can enter for the program.



The Advanced Properties dialog box.

The Advanced Properties dialog box offers several options:

- DOS displays any information you type in the Help text box when you press F1 while the program is highlighted.
- The memory options tell DOS how much memory the program needs to run. DOS does not start a program if less than 384K of memory is available. If the program is very small, you can specify a smaller amount of memory in kilobytes.
- If the program displays in graphics mode, such as 1-2-3 Release 3 or Ventura Publisher, choose the graphics options to ensure that DOS has enough memory available to save the screen display.
- If your application program uses any of the Task Swapper shortcut keys, you can tell DOS not to use those keys so that they remain available to the program. If you reserve all three keys for use by the program, you cannot switch out of the program without quitting.

Do not switch out of a connected communications program. To prevent such a switch, select the Prevent Program Switch option.

Lessons Learned

- You easily can run programs in a number of ways using the Shell.
- You can organize programs into groups.
- You can specify properties that tell DOS how to execute each program.
- You can run multiple programs at the same time and switch among them easily.
- You can associate a file extension with a program. When you open that data file, DOS runs the program associated with that data file.
- You can run a program with replaceable parameters that the user specifies when running the program.

So far, you have worked in the DOS Shell only. Next you will venture beyond the Shell and learn how to operate your computer from the command line.

8

9

Using the DOS Command Line

Getting acquainted with command syntax

Issuing commands

Adding parameters

Understanding wild cards

Using the DIR command

Using paths and changing directories

Understanding the directory listing

Copying files

Executing Programs

Have you ever met someone who intimidated you? Maybe the person was taller, spoke in an authoritative voice, or projected an unusually strong image. This feeling happens to everyone. Often, though, initial impressions have little to do with the true nature of a person. The same is true of DOS. Despite what you may hear, DOS is designed to be well-mannered. So far we have avoided the "dreaded DOS prompt" as it is sometimes called, but you soon will find that it is not so hard to execute commands from the command line.

Before DOS 5, you really had to learn the command line first to do any useful work. Now you can learn the command line after you become familiar with using DOS and running programs. With eight chapters of DOS experience under your belt, using the command line will be easy to master.

Key Terms Used in This Chapter

Command	A collection of characters that tell the computer what you want it to do. Most commands are mnemonics of English words, with single numbers or letters often added as optional instructions.
Command Line	The line at the DOS prompt on which you type DOS commands rather than using the Shell.
Syntax	The specific set of rules you follow when you issue commands.
Parameter	Any additional information after the command name in the command syntax that refines what you want the DOS command to do.
Switch	A part of the command that turns on an optional instruction or function.
Delimiter	A character that separates the parts of a command. Common delimiters are the space and the slash (/).
Path	A DOS command parameter, which tells DOS where to find a file or where to carry out a command.
Wild card	A character you substitute for another character or characters.

Moving from the Shell To the Command Line

This book has covered a lot of territory already. You have learned about the structure of DOS, about disks and directories, and how to use the DOS Shell to perform the most important commands and to run programs. You now know how to be fully productive with your personal computer, DOS, and your application programs. And this was all done without using the DOS command line.

So why bother with the command line now? There are a number of reasons:

- Not all DOS commands can be executed from the Shell. Sometimes you must use the command line.

- You must know the command line to create batch files to customize your system, as explained in Chapter 12.
- You sometimes used the command line inside the Shell without knowing it. When you complete the parameters in the dialog box for the Format command, you are really using a command line. When you complete the Commands box in a Program Properties dialog box, you are completing a command line. Once you know more about how to use the command line, you will find it even easier to use the Shell.

Most of what you can do in the Shell you can do at the command line. Usually, the Shell is much easier to use. At times, you will find that certain commands, or sequences of commands are faster to run from the command line. When you know how to use both methods, you have more control over your personal computer.

When you use the command line, you use the DOS prompt or the command p*rompt*. All three terms mean exactly the same thing. The prompt on the command line is how DOS tells you that it is ready for your next command. You can alter this prompt, and you learn how to change the prompt in Chapter 12. The standard prompt that most people use with a hard disk displays the current drive and path. With this prompt, you always know the current directory. For example, when you first boot your computer, the prompt is: C:\>.

9

Important Concepts about Commands and the Command Line

To tell DOS what you want it to do, you enter DOS *commands*. Commands are letters, numbers, and acronyms separated—or de*limited*—by certain other characters. Stripped of jargon, DOS command usage is like telling your dog to "sit," "heel," and "stay." Additionally, you can tell your computer to "sit and bark" concurrently. DOS commands frequently, though not exclusively, use slash marks (/) to indicate such additional instructions.

A command you give to DOS is similar to a written instruction you might give to a work associate, but with DOS you must be precise. People use interconnecting words and inferences that the human brain can easily grasp. DOS knows only what its developers programmed it to understand.

When you type a command in its proper form—or sy*ntax*—at the DOS prompt, both the DOS command and any additional parameters communicate your intent. Both relay the action you want to perform and the object of that

action. Remember, your main tool for communication with your PC is the keyboard. Your PC is ready to work for you, but it doesn't respond to humor, anger, frustration, or imprecise syntax.

Assume that you have an assistant with a limited vocabulary. If you want a sign on a bulletin board duplicated for posting on another bulletin board, you might instruct, "Copy sign A to sign B. Make sure that the copy is free from errors."

Similarly, if you want DOS to duplicate the data disk in drive A on a disk you've placed in drive B, you give DOS the following instruction:

```
DISKCOPY A: B:
```

To have DOS, the efficient helper, compare the copy and the original, type this:

```
DISKCOMP A: B:
```

DISKCOPY and DISKCOMP are good examples of DOS commands that are clearly named to explain the activity they execute. The letters A: and B: are the disk drives you want DOS to use.

Although you'll rarely use more than 10 commands, DOS recognizes and responds to dozens of commands. The most common of these commands are built into the command processor (COMMAND.COM) and are instantly available at the system prompt. Because these commands are always ready for use, they are called *internal* commands. When you execute commands using the Shell menu, you are really executing internal commands.

Other commands are stored as individual programs in the DOS directory of your hard disk. These commands are located, loaded, and executed when you type them at the system prompt and press ↵Enter. These commands are *external* commands. External commands can execute from the system prompt in the same way as internal commands. The commands in the Main and Disk Utilities groups in the shell are examples of external commands.

Learning the ins and outs of issuing DOS commands takes practice. DOS commands follow a logical structure, but that structure is far more rigid than a casual conversation with a neighbor. Some of this rigidity is masked when you use the Shell.

The strength of DOS is that once you understand its rules, everything flows easily. Commands conform to standard rules in their command-line structure. DOS is easier to use when you understand the concepts behind the commands. You can then generalize rules to different commands.

To feel comfortable with DOS commands, remember these rules:

- DOS requires that you use a specific set of rules, or syntax, when you issue commands.
- Parameters, part of a command's syntax, can change the way a command is executed.

You can think of the command name as the action part of a DOS command. In addition to the name, many commands require or allow further directions. Any such additions are called *parameters*. Parameters tell DOS what to apply the action to or how to apply the action. Using DOS commands is quite easy if you follow the rules of order and use the correct parameters.

The worst part about many DOS manuals is that they present you with something that may resemble a French menu if you speak no French. And, like the waiter standing over you with a casual, smug attitude, these other DOS books make little effort to help you navigate through the menu. In fact, most DOS manuals are agony for the new user. Even the experienced user can be driven to hair pulling in fruitless quests for information.

MS-DOS 5 QuickStart is designed to be pleasurably read from cover to cover. It introduces DOS to new users, but much of it can serve as a review for the more experienced user. This book makes a gourmet presentation, but the menu is in English.

Syntax

Syntax is the structure, order, and vocabulary in which you type the elements of the DOS command. Using proper syntax when you enter a DOS command is comparable to using proper English when you speak. DOS must clearly understand what you are typing to carry out the command.

When you use the Shell, you do not have to know some of the syntax because the information is built into the menus and program items. You do run into the rules of syntax when you must complete the Program Properties dialog box. With the Shell, you must know the syntax once to complete the Program Properties dialog box. With the command line, you must know the syntax every time you execute the program.

Unfortunately, many DOS manuals use "symbolic form" to describe command syntax, without revealing what each term means. Such books frequently list every command switch (option), as though multiple switches are a normal part of the command.

In fact, many DOS commands cannot be issued to accept every possible option. Using all the options is like ordering a sandwich with white, rye, whole wheat, *and* cinnamon-raisin bread. The choice is usually either/or, rather than all. A command should contain nothing more than what you want to instruct DOS to do.

Simply stated, symbolic form is the use of a letter or name for illustrative purposes. A file used to illustrate a command might be called EXAMPLE.COM. Actually, EXAMPLE.COM exists only in the mind of the writer. It is an example. When you enter the real command, you are supposed to substitute a real name for the symbolic one.

Symbolic form is used to describe not only files, but also the entire command line. A DIR command shown in symbolic form looks like this:

DIR *d:path\filename.ext/W/P/A:(attributes)/O:(order)/S/B/L*

For example, a command you might use in the real world looks like this:

DIR *C:/P*

As you can see, symbolic notation can confuse, rather than enlighten, until you understand the concept behind the form.

9

Switches

A *switch* is a parameter that turns on an optional function of a command. In the DIR example, /W and /P are switches. Note that each switch is a character preceded by a slash. Not all DOS commands use switches. In addition, switches may have different meanings for different commands.

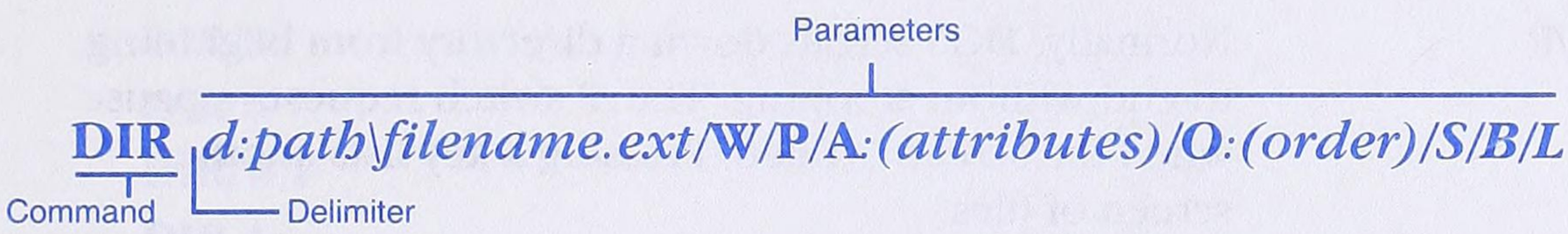
You can use the /W switch with the DIR command to display a wide directory of files. Normally, DIR displays a directory with one file listing per line. The date and time the file was created is displayed next to the file name. As the screen fills, the first files scroll off the top of the display. The /W switch displays a directory listing that shows only file names and extensions.

Sometimes a directory contains too many files to display on one screen. When you use the /P switch with the directory command, 23 lines of file names, or approximately one screen full, are displayed. The display pauses when the screen fills. At the bottom of a paused directory listing, DOS prompts you to `Press any key to continue` to move to the next screen full of files. The /P switch thus enables you to see all the files in the directory, one screen at a time.

When DOS says `Press any key to continue`, it means to press *almost* any key. If you press the Shift, Alt, Caps Lock, Num Lock, or Scroll Lock keys, DOS ignores you. The easiest keys to press are the s**pace bar** or the ↵Enter key.

The other switches are explained later.

Many DOS commands can be typed in several forms and still be correct. Although the simple versions of DOS syntax work effectively, most DOS manuals show the complete syntax for a command, which again can confuse you. For example, the syntax for the DIR command looks like this:



Now, break down the sample command piece by piece. You'll see that, rather than being an actual command, it is the symbolic form of all the alternatives.

DIR — You want a directory listing to be run. A normal directory listing without any switches (options) appears in vertical form. The listing shows not only file names, but also the file size and the time and date of each file's last modification. To get this listing, type **DIR**. Do not leave a space between the > symbol and the name.

d: — The drive containing the directory listing. If the system prompt indicates the drive you want, you don't need to type anything. If you want a directory listing of another drive, type the appropriate drive letter.

path — The path to the directory that contains the files you want listed. If you want a directory listing of the files in the current directory, you don't need a path. In fact, the path is rarely used.

filename.ext — Symbolic form meaning "substitute the file name." DOS never allows more than one file with the same name in any one directory. Other than to display that file's size and the amount of space free on that disk, the term has little meaning when you use the DIR command.

For example, the following command adds the file name parameter:

```
DIR C:MYFILE.TXT
```

	In symbolic notation, MYFILE.TXT is shown as *filename.ext*.
/W	A switch for the DIR command. /W requests that DOS display a horizontal (or wide) directory listing, instead of showing a single vertical listing. The wide listing provides no information other than the file name. The command DIR/W displays a wide directory listing. The / is the delimiter. It tells DOS that a switch is about to follow.
/P	Normally, DOS scrolls down a directory from beginning to end without stopping. The /P switch requests a pause when the screen is filled. Pressing a key lists another screen of files. Typing DIR at the DOS prompt produces a directory of the disk that is on the logged drive. Long listings may scroll off the screen. To halt scrolling temporarily, press Ctrl-S or Pause. Press any key to continue.
/A:*(attributes)*	The /A: switch lists only files with certain file attributes. You can list or exclude from the list hidden files (h), system files (s), directories (d), archived files (a), and read-only files (r). A minus sign before the attribute means do not list a file with that attribute. The colon (:) after the A is optional but makes the command easier to understand.
/O:*(order)*	This switch specifies the sort order of the listing. The order may be alphabetical by name (n), alphabetical by extension (e), by date and time (d), by size (s), or directories grouped before files (g). A minus sign before the sort order means to reverse the order. The colon (:) after the O is optional but makes the command easier to understand.
/S	This switch means also to list the files in all subdirectories.
/B	This switch means to list only the filenames with no spaces between the name and the extension.
/L	This switch means to display the information in lowercase instead of uppercase.

At this point, you probably think that the DIR command is much too complicated for anyone except the most advanced DOS experts. Actually, DIR is the easiest command to use, because most of this information is ignorable. In the Shell, the Directory Tree and the Files list areas display this information in a slightly different format. Most of these DIR options are available by choosing Display from the Options menu.

Among the many thousands of possible DIR command possibilities, you can type the DIR command in the following ways:

DIR

DIR/P

DIR/W

DIR/W/P

DIR A:

DIR A:/P

DIR /P/A:d

DIR /W/O:d

DIR /B

DIR /A:e/S

DIR /L

```
EXPAND   EXE     15423 12-13-90   4:09a
README   TXT     22398 12-13-90   4:09a
NETWORKS TXT     74759 12-13-90   4:09a
UMB      TXT     27574 12-13-90   4:09a
GRAFTABL COM     10053 12-13-90   4:09a
GRAPHICS COM     19374 12-13-90   4:09a
GRAPHICS PRO     21226 12-13-90   4:09a
CATAPULT BAS     28135 12-13-90   4:09a
NIBBLES  BAS     20473 12-13-90   4:09a
JOIN     EXE     17614 12-13-90   4:09a
LCD      CPI     10703 12-13-90   4:09a
NLSFUNC  EXE      6924 12-13-90   4:09a
PRINTER  SYS     18760 12-13-90   4:09a
SUBST    EXE     18350 12-13-90   4:09a
CLEANUP  EXE     43946 12-13-90   4:09a
Press any key to continue . . .

(continuing C:\DOS)
CLEANUP  INF      1151 12-13-90   4:09a
COMMAND  COM     46246 12-13-90   4:09a
QBASIC   INI       175 01-21-91   9:43p
       88 file(s)    2238633 bytes
                     5838848 bytes free

C:\DOS>
```

The command **DIR/P** displays the directory listing page by page. The command itself scrolls off the screen when you press a key to continue listing the directory.

The command **DIR/W** displays the directory listing in a wide arrangement, but you lose information about individual files.

```
 Volume Serial Number is 1635-9ECA
 Directory of C:\DOS

[.]             [..]            EGA.SYS         DISPLAY.SYS     FORMAT.COM
PACKING.LST     ANSI.SYS        COUNTRY.SYS     HIMEM.SYS       KEYB.COM
KEYBOARD.SYS    MODE.COM        SETVER.EXE      SYS.COM         UNFORMAT.COM
DEBUG.EXE       DOSKEY.COM      EDLIN.EXE       EMM386.EXE      FASTOPEN.EXE
FC.EXE          FDISK.EXE       MEM.EXE         MIRROR.COM      MORE.COM
RAMDRIVE.SYS    SHARE.EXE       SMARTDRV.SYS    UNDELETE.EXE    GWBASIC.EXE
XCOPY.EXE       DOSSHELL.VID    DOSSHELL.INI    DOSSHELL.COM    DOSSHELL.EXE
LINK.EXE        DOSSHELL.GRB    DOSSWAP.EXE     EXE2BIN.EXE     PRINT.EXE
REPLACE.EXE     TREE.COM        DOSSHELL.HLP    EDIT.HLP        RECOVER.EXE
DOSHELP.HLP     HELP.EXE        QBASIC.HLP      EDIT.COM        MSHERC.COM
QBASIC.EXE      MONEY.BAS       REMLINE.BAS     APPEND.EXE      ATTRIB.EXE
BACKUP.EXE      CHKDSK.EXE      COMP.EXE        DISKCOMP.COM    DISKCOPY.COM
FIND.EXE        LABEL.EXE       RESTORE.EXE     SORT.EXE        4201.CPI
4208.CPI        5202.CPI        ASSIGN.COM      DRIVER.SYS      EGA.CPI
EXPAND.EXE      README.TXT      NETWORKS.TXT    UMB.TXT         GRAFTABL.COM
GRAPHICS.COM    GRAPHICS.PRO    CATAPULT.BAS    NIBBLES.BAS     JOIN.EXE
LCD.CPI         NLSFUNC.EXE     PRINTER.SYS     SUBST.EXE       CLEANUP.EXE
CLEANUP.INF     COMMAND.COM     QBASIC.INI
       88 file(s)     2238633 bytes
                      5838848 bytes free

C:\DOS>
```

9

The command **DIR /A:D** lists only the directories.

```
C:\DATA>DIR /A:D

 Volume in drive C is DRIVE_C
 Volume Serial Number is 1635-9ECA
 Directory of C:\DATA

.            <DIR>      01-28-91   3:18p
..           <DIR>      01-28-91   3:18p
TAXES        <DIR>      01-28-91   3:18p
PERSONAL     <DIR>      01-30-91   5:45p
HOMEFIN      <DIR>      01-30-91   5:46p
WORK         <DIR>      01-30-91   5:46p
NLETTER      <DIR>      02-14-91   8:50a
DOCS         <DIR>      02-14-91   8:50a
        8 file(s)              0 bytes
                         5838848 bytes free

C:\DATA>
```

```
C:\DATA>DIR /A:D/O:N

 Volume in drive C is DRIVE_C
 Volume Serial Number is 1635-9ECA
 Directory of C:\DATA

.            <DIR>      01-28-91   3:18p
..           <DIR>      01-28-91   3:18p
DOCS         <DIR>      02-14-91   8:50a
HOMEFIN      <DIR>      01-30-91   5:46p
NLETTER      <DIR>      02-14-91   8:50a
PERSONAL     <DIR>      01-30-91   5:45p
TAXES        <DIR>      01-28-91   3:18p
WORK         <DIR>      01-30-91   5:46p
       8 file(s)              0 bytes
                        5838848 bytes free

C:\DATA>
```

The command **DIR /A:D/O:N** lists only the directories sorted by the name of the directory.

```
C:\>DIR /A:S

 Volume in drive C is DRIVE_C
 Volume Serial Number is 1635-9ECA
 Directory of C:\

IO       SYS     33044 12-13-90   4:09a
MSDOS    SYS     37506 12-13-90   4:09a
       2 file(s)      70550 bytes
                    5838848 bytes free

C:\>
```

In the root directory of a bootable disk, **DIR /A:S** lists the DOS system files. These files normally do not display on a directory listing.

The command **DIR /W/O:E/S** lists the files in wide format, in order by the file extension and also lists files in subdirectories. The first directory has scrolled off the screen.

```
Directory of C:\123R3\ADDINS

[.]             [..]            WYSIWYG.DLD     WYSIWYG.PLC
        4 file(s)       7015 bytes

Directory of C:\123R3\WYSIWYG

[.]             [..]            WYSIWYG.ALD     AA0003.BCO      AI0011.BCO
HP4-A.CAR       HP4-B.CAR       HP4-C.CAR       HP4-D.CAR       HP4-E.CAR
HP4-F.CAR       HP4-G.CAR       HP4-H.CAR       HP4-J.CAR       HP4-K.CAR
HP4-L.CAR       HP4-M.CAR       HP4-N.CAR       HP4-P.CAR       HP4-Q.CAR
HP4-T.CAR       HP4-U.CAR       HP4-V.CAR       HP4-Y.CAR       HP4-Z.CAR
FONTGEN.EXE     LIB123.EXE      IFL.EXE         WYSIWYG.HLP     COUR.IFL
DUTCH.IFL       HELV.IFL        LGOTHIC.IFL     LINEPR.IFL      LMBCS.IFL
P-AVGARD.IFL    P-BOOKMN.IFL    P-CHNCRY.IFL    P-CNTURY.IFL    P-DINGB.IFL
P-HLV-C.IFL     P-HLV.IFL       P-PALTNO.IFL    PRESTIGE.IFL    P-TIMES.IFL
SWISS.IFL       TMSRMN.IFL      XSYM.IFL        WYSIWYG.LBR     FONTS.LBR
FONT.LST        PRINTER.LST     WYSIWYG.RI      AA0003.TDF      AI0011.TDF
       55 file(s)     1756106 bytes

Total files listed:
      187 file(s)     5045756 bytes
                      5838848 bytes free

C:\123R3>
```

Don't worry about your PC pulling something sneaky when you type a command. No command you type is executed until you press the ↵Enter key. Operating DOS is simpler than you might expect. Just remember that as you gain experience you may begin to use even potentially dangerous commands in a routine manner.

To show you how routine DOS commands can be potentially dangerous, consider the command that strikes fear in every new PC user: the *DEL,* or *ERASE*, command. You learned the Delete command in the Shell in Chapter 7.

9

Experienced computer users make mistakes with DEL more than with any other DOS command. They occasionally zip through their work in a careless manner. In most instances, DOS is forgiving. After all, who really cares if you accidentally type a request to view a directory of a different drive than you really want? Retyping the instruction properly is a simple matter. The DEL command, however, is an exception.

The DEL and the ERASE commands are one and the same. These commands erase from a designated directory a file or group of files. If you allow yourself to get careless when issuing this command, you can get into big trouble.

Issuing Commands

The command name is a key to DOS. The command processor COMMAND.COM reads the command you type. COMMAND.COM can carry out several "built-in" commands. It also knows how to load and run the

external utility programs you enter at the DOS prompt. In the Shell, you select a command from a menu or a list of programs in a group. At the command line, you type the command name.

Typing the Command Name

When you type a command, do not leave a space after the greater-than sign (>) of the DOS prompt. Enter the DOS command name directly after the prompt. If the command has no parameters or switches, press the ↵Enter key after the last letter of the command name. For example, you type the directory command as **DIR** at the prompt and then press ↵Enter.

Adding Parameters

When you enter parameters that are not switches, this book shows them in two ways: lower- and uppercase. You must supply the value for the lowercase text. The lowercase letters are shorthand for the full names of the parts of a command. Uppercase means that you enter letter-for-letter what you see.

Remember that you delimit, or separate, parameters from the rest of the command. Most of the time the delimiter is a space, but other delimiters, such as the comma (,), the backslash (\), and the colon (:) exist. Just look at the examples in this book to learn the correct delimiter.

If the example command has switches, you can recognize them by the preceding slash (/). Always enter the switch letter as shown. Remember to type the slash. These rules also apply when you complete a Commands box in a Program Properties dialog box or a replaceable parameter dialog box in the Shell. You were really learning rules for using the command line in Chapter 8.

Ignoring a Command (Esc)

Don't worry if you mistype a command. Until you press ↵Enter, DOS does not act on the command. You can correct a mistake by using the arrow keys or the Backspace key to reposition the cursor. Press Esc if you want to start again

from the beginning. The Esc key withdraws the entry and gives you a new line. Just remember that these line-editing and canceling tips work only before you press the Enter key. Some commands can be successfully stopped with the Ctrl-C or Ctrl-Break sequence, but checking that the command is typed correctly is always good practice.

To reposition the cursor, use the arrow keys or the ← Backspace key. To clear the last entry, press Esc and retype the command.

```
C:\>DIRR MYFL\
```

Executing a Command

The Enter key is the action key for DOS commands. Make it a habit to pause and read what you type before you press Enter. After you press Enter, the computer carries out your command. During the processing of the command, DOS does not display any keystrokes you might type. DOS does remember your keystrokes, however, so be aware that the characters you type could end up in your next command.

Using DOS Editing Keys

When you type a command line and press the Enter key, DOS copies the line into an input buffer, a storage area for commands. You can pull the last command line from the buffer and use the line again. This feature is helpful when you want to issue a command that is similar to the last command you used. Table 9.1 lists the keys you use to edit the input buffer.

Table 9.1
DOS Command Line Editing Keys

Key	*Action*
Tab ⇆	Moves cursor to the next tab stop.
Esc	Cancels the current line and does not change the buffer.
Ins	Enables you to insert characters in the line.
Del	Deletes a character from the line.
F1 or →	Copies one character from the preceding command line.
F2	Copies all characters from the preceding command line up to the next character you type.
F3	Copies all remaining characters from the preceding command line.
F4	Deletes all characters from the preceding command line up to, but not including, the next character typed (opposite of F2).
F5	Moves the current line into the buffer, but does not allow MS-DOS to execute the line.
F6	Produces an end-of-file marker when you copy from the console to a disk file.

Using DIR To View File Lists

The DIR command displays more than a list of file names. As your computing expertise grows, you will find many uses for the information provided by the full directory listing.

```
Volume in drive C is DRIVE_C
Volume Serial Number is 1635-9ECA
Directory of C:\123R22

.            <DIR>      10-03-90   3:48p
..           <DIR>      10-03-90   3:48p
123      CMP    138641 06-15-89  12:00a
123      CNF       376 02-14-91  10:22p
123      DLD      5148 04-24-89   5:54p
123      DYN     12436 06-15-89   2:01p
123      EXE     15424 07-13-89  11:03a
123      HLP    198883 06-15-89   3:18p
123      RI      36319 06-15-89   4:40p
123      SET     49545 12-05-90   5:14p
ADN_MGR  DRV     21748 01-21-88  12:00a
BLOCK1   FNT      5732 02-26-89  10:20p
BLOCK2   FNT      9273 02-26-89  10:20p
BOLD     FNT      8684 02-26-89  10:20p
BUD      CNF       376 05-04-90  11:45a
BW       SET     38653 09-13-90  12:16p
DATA     CNF       376 04-12-90  10:17a
DBF2     XLT     38144 06-08-89   5:32a
DBF3     XLT     44208 06-11-89  11:02p
Press any key to continue . . .
```

123 — 123 is the file name. The file name is three characters long, but may be as long as eight characters.

EXE — EXE is the extension. This is an executable program file.

15424 — 15424 is the file size in bytes.

07-13-89 — The file was created or last modified July 13, 1989.

11:03a — Time of creation or modification was 11:03 a.m.

Defining the DIR Command

A directory is a list of files. With the DIR command, you get the following information:

- The drive letter
- The volume label
- The volume serial number assigned by DOS
- The name of the directory
- Five columns of information about the files
- The number of files listed
- The total number of bytes in the files listed
- The amount of unused space on the disk

Try the DIR command now. Type

DIR

and press ↵Enter. You just told DOS to list the files on the logged drive. You can also type **DIR A:** to specify drive A or **DIR C:** to list the files on drive C. The A and C are the drive parameters. If you don't specify a drive, DOS uses the current drive by default.

In the Shell, you changed the current drive by selecting a drive from the list of disk drive icons. At the command line, you can change the current drive by typing a drive letter and a colon and pressing ↵Enter. For example, by typing **A:** at the DOS prompt, you change the current drive to drive A. A disk must be in a drive before DOS can make it the current drive. By changing the current drive, you can switch between a hard disk and a floppy disk.

Specifying Other Directories

Most DOS commands use one or more files. When you issue a command that involves files, DOS uses the files in the current directory as the default. To tell DOS to look at files in another directory, you must specify the path to the other directory. The path was defined in Chapter 5. Because paths can be very important when you use the command line, we'll review paths here.

Path Names

A path name is a chain of directory names that tells DOS where to find the files you want. You must build complete path names when you use the prompt. When you use the Shell, the paths are visually supplied in the Directory Tree area.

To create a path name chain, you type the drive name, a subdirectory name (or sequence of subdirectory names), and the file name. Make sure that you separate subdirectory names from each other with a backslash (\) character. Using symbolic notation, the path name looks like this:

d:\directory\directory …\filename.ext

In this notation, *d:* is the drive letter. If you omit the drive specifier, DOS uses the current drive as the default drive. The first \ after the drive letter is the root directory.

The *directory\directory…* names the directories you want to search. The ellipsis (…) simply means that you can add other directories to the specifier list. If you omit the directory specifier from the path name, DOS assumes that you want to use the current directory.

filename.ext is the name of the file. Notice that you use a \ to separate directory names and the file name. The path name fully describes to DOS where to direct its search for the file. When you use the DIR command, if you do not specify a file name, all files in the directory are listed. With other commands, such as COPY, you must specify a filename. The following examples just show the paths to the directory you want.

To specify a file in the DATA directory on the C drive, the complete path is

```
C:\DATA
```

For files in the TAXES subdirectory of the DATA directory on the C drive, the complete path is

```
C:\DATA\TAXES
```

If the C drive is the current drive, you do not have to include the drive letter. The path then can be

```
\DATA\TAXES
```

Where the Search Starts

When you type a path name, DOS starts in the first specified directory. Then it passes through the other specified directory branches. The root directory has no name and is represented by the backslash (\). All directories grow from the root directory. If you want the search path to start at the root directory, begin the directory specification with a \. DOS begins its search for the file in the root and follows the subdirectory chain you include in the command.

To list all the files in the C:\DATA\TAXES directory, use the command:

```
DIR C:\DATA\TAXES
```

If the C drive is the current drive, you can use the following command:

```
DIR \DATA\TAXES
```

If the current directory is C:\DATA, you can tell DOS to start the search at the current directory and simplify the command to:

```
DIR TAXES
```

Notice that the path above does not start with a backslash. This means that the path starts in the current directory. The complete path that DOS uses is:

```
C:\DATA\TAXES
```

If the directory path that you specify contains directories that do not exist, you get an error message. The error message depends on the command you are using. For example if you type the command

```
DIR TAXES
```

from the root directory, you get a `file not found` error message. If you issue the same command from the DATA directory, you get a listing of all the files in the C:\DATA\TAXES directory.

Changing Directories

In the Shell, you changed the current directory by selecting a directory from the Directory tree. At the command line, you use the CD or CHDIR change directory command. Both commands are identical. Most people just use CD to change directories because it is shorter than CHDIR.

The CD command changes your position in the tree structure of directories. Decide which subdirectory you want as a working directory. Issue the command at the DOS prompt in the form:

```
CD path
```

To change to the DOS directory, enter the command

```
CD \DOS
```


With the standard prompt, you can see that you have changed directories because the prompt changes to C:\DOS>. You can use CD to change to a directory from which you want information. Whenever you are positioned in the directory that holds the commands or data you need to use, you can omit the directory name from the command line. When you issue the CD command, the directory you change to becomes the default directory.

When you change directories, the rules for directory paths are the same as they are for the DIR command. If you start the path with a backslash, the path starts at the root directory. If you omit the initial backslash, the path starts at the current directory. To change to the \DATA\TAXES directory, use the following command:

```
CD \DATA\TAXES
```

If the \DATA directory is the current directory, you can simplify the command to:

```
CD TAXES
```

When the root directory is the current directory, it does not matter if you use the initial backslash or not. From the root directory,

```
CD \DATA\TAXES
```

has the same effect as

```
CD DATA\TAXES
```

Controlling Scrolling

Scrolling describes how a screen fills with information. As the screen fills with information, the lines of the display scroll off the top of the screen. To stop a scrolling screen, you press the key combination Ctrl-S. Press any key to restart the scrolling. On enhanced keyboards, press the Pause key to stop the scrolling.

File Names and Extensions

The file name contains two parts: the name and the extension. A period delimits the file name and its extension. In the directory listing, however, spaces separate the file names and extensions.

In any single directory, each file must have a unique name. DOS treats the file name and the extension as two separate parts. The file names MYFILE.WK1 and MYFILE.ABC are unique because each file has a different extension. The file names MYFILE.WK1 and YOURFILE.WK1 are also unique. Many DOS commands make use of the two parts of the file name separately. For this reason it is a good idea to give each file a file name and an extension.

File names should help you identify the contents of a file. DOS file names can contain only eight alphanumeric characters, plus a three-character extension. With this built-in limit, meeting the demand of uniqueness and meaningfulness needed for some file names can require ingenuity.

DOS is also specific about which characters you use in a file name or an extension. To be safe, use only letters of the alphabet and numbers, not spaces or a period. DOS truncates excess characters in a file name.

File Size and Date/Time Stamps

In the directory listing, the third column shows the size of the file in bytes. This measurement is an approximation of the size of your file. Your file can actually contain somewhat fewer number of bytes than shown. Because

computers reserve blocks of data storage for files, files with slightly different data amounts may have identical file-size listings. This disk-space allocation method also explains why your word processing memo with only five words can occupy 2K of file space.

The last two columns in the directory listing display a date and a time. These entries represent the time you created the file or, with an established file, the time you altered the file. Your computer's internal date and time are the basis for the date and time stamp in the directory. As you create more files, the date and time stamp become invaluable tools in determining the most recent version of a file.

The Wild-Card Characters

Technically, the wild card is a character in a file specification that depicts one or more characters. In DOS, the question mark (?) character represents any single character. The * represents all characters in a file name.

For example, although the command, COPY A:*.BAT C:/V, looks like hieroglyphics from an Egyptian tomb, all it says is this:

- This is a copy function.
- From the disk in drive A, copy everything (designated by the asterisk) that ends with the three-letter extension BAT.
- Place a copy of these files in drive C.
- And (represented by the /V) verify that the copy is the same as the original.

Using Wild Cards in the DIR Command

You can use wild cards with the DIR command. The following text provides examples of the use of wild-card characters.

One form of the DIR command looks like this:

```
DIR d:filename.ext
```

When you use DIR alone, DOS lists all files in the current directory. When you use DIR with a file name and extension parameter, DOS lists files that match the parameter. In place of filename.ext, type **MYFILE.WK1**:

```
DIR MYFILE.WK1
```

The DIR command you just typed tells DOS to list all files in the current directory matching MYFILE.WK1. The directory lists only one file, MYFILE.WK1.

If you want a listing of all files that have an extension of WK1, type the following command:

```
DIR *.WK1
```

DOS lists any file in the current directory that has a WK1 extension. For example, the file names MYFILE.WK1 and YOURFILE.WK1 would display.

If you issue the command

```
DIR MYFILE.*
```

you might get a listing of MYFILE.WK1 and MYFILE.XYZ.

You can use extensions of file names to specify what the file contains. Files containing correspondence can have a LET extension, and memo files the extension MEM. This practice lets you use the DIR command with a wild card to get separate listings of the two types of files.

The ? wild card differs from the * wild card. Any character that is in the precise position as the ? is a match. If you issue the command DIR MYFILE?.WK1, files such as MYFILE1.WK1 and MYFILE2.WK1 appear, but MYFILE.WK1 doesn't. The same rules apply to other commands that allow wild cards.

Using the Copy Command from the Command Line

You learned how to use the COPY command with the Shell in Chapter 7. Just like the procedure you followed in the Shell, you first select the file, use the menu to choose the Copy command, and specify the destination in a dialog box. From the command line, you specify all information at one time before you press Enter to tell DOS to execute the command.

The syntax for the COPY command is as follows:

```
COPY source destination
```

The source is the path and file specification of the files to be copied. The destination is the path and file specification for each copied file. Paths follow the rules that were discussed above for DIR and CD.

Because of the use of wildcards, you may find it more convenient to copy groups of files from the command line rather than from the Shell. The best way to learn how to use the COPY command is to look at a few examples.

To copy MYFILE.WK1 from the current directory to drive A, type

```
COPY MYFILE.WK1 A:
```

Because no destination file name is specified, the file name is not changed and MYFILE.WK1 now exists in two places.

To make a duplicate of MYFILE.WK1 in the current directory with the name MYFILE.BAK, type

```
COPY MYFILE.WK1 BACKUP.WK1
```

To copy MYFILE.WK1 from the current directory to drive A and change its name to BACKUP.WK1, type

```
COPY MYFILE.WK1 A:BACKUP.WK1
```

To copy all files with the WK1 extension from the current directory to drive A, type

```
COPY *.WK1 A:
```

To copy all files with a file name that starts with BUDGET from the current directory to drive A, type

```
COPY BUDGET*.* A:
```

The preceding command copies files with names such as BUDGET.WK1, BUDGET1.WK1, BUDGET91.WK1, BUDGET.DOC, and BUDGET91.ZIP.

To copy all files from the current directory to drive A, type

```
COPY *.* A:
```

To copy all files with the WK1 extension from the \DATA\TAXES directory to the \BACKUP directory, type

```
COPY \DATA\TAXES\*.WK1 \BACKUP
```

Using Other Commands from the Command Line

This chapter has discussed the DIR, CD, and COPY commands to demonstrate how to use the command line. All of the commands you can execute from the Shell can be executed from the command line, if you know the command name. All commands follow the same rules for specifying paths and files.

You can find more detailed information about these commands in Chapter 14, the Command Reference.

Some of the more common command names follow:

Command	*Shell Command and comments*
DIR	Automatically displays in the File list area. Use File Display Options from the Options menu to change what files display and in what order.
CD or **CHDIR**	Change the highlighted directory in the Directory Tree area
TREE	Automatically displays in the Directory Tree area
COPY	Copy from the File menu
DEL or **ERASE**	Delete from the File menu or the Del key
COPY and **DEL**	Move from the File menu. DOS does not contain a MOVE command; you must COPY the files and then DEL them.
TYPE	View File Information from the File menu. In the Shell, you get a full-screen display. With TYPE, the file text just scrolls down the screen.
REN or **RENAME**	Rename from the File menu
MD or **MKDIR**	Create Directory from the File menu. On the command line, MD means Make Directory.
RD or **RMDIR**	Delete from the File menu or the Del key with an empty directory highlighted. On the command line, RD means Remove Directory; in the Shell the command is Delete.
ATTRIB	Change attributes from the File menu

Command	*Shell Command and comments*
EDITOR	Editor in the Main group
DISKCOPY	Disk Copy in the Disk Utilities group
BACKUP	Backup Fixed Disk in the Disk Utilities group
RESTORE	Restore Fixed Disk in the Disk Utilities group
FORMAT	Format or Quick Format in the Disk Utilities group. The same command is used for both formats. To quick format, use the /Q switch.
UNDELETE	Undelete in the Disk Utilities group

Executing Programs from the Command Line

You execute programs from the command line using the same commands that you entered into the Commands box in the Program Properties dialog box. For example, to add WORD to a program group, the Commands box for WORD was:

```
C:\WORD\WORD
```

You would type the same command at the command line to start WORD.

The Commands box for 1-2-3 included a startup directory that contained the 1-2-3 program files. If 1-2-3 is in the C:\123R22 directory, first you must make the 1-2-3 directory the current directory. This could take two or three commands:

```
C:
CD\123R22
123
```

If the current disk is drive C, you can skip the first command.

You can use the PATH command and batch files to make it easier to execute programs. This is covered in Chapter 12.

Lessons Learned

- The commands that you execute from the Shell you can also execute from the command line.
- DOS requires accuracy in issuing commands, not because it is unfriendly, but because its syntax is limited. Don't be intimidated by the DOS command line.
- Although DOS has dozens of commands, you use fewer than 10 with any frequency.
- Fancy terms can have simple descriptions. For example, a delimiter is a character used as a separator.
- DOS uses the current path as the default when you execute commands. You can specify a different path or change the current directory before you execute the command.
- Wild cards are the shorthand of DOS commands. The asterisk (*) can stand for any number of characters, and the question mark (?) substitutes for one letter in a command.
- The DIR command lists files in a directory.
- A directory listing tells you the file name, size (in bytes), and time and date of last update.
- It can be easier to use wild card characters to copy groups of files then to use the Shell.
- You execute programs from the command line using the commands that you enter in the program's Program Properties dialog box.

Now that you know the command line, you can explore additional commands.

10

Protecting Your PC's Data

Avoiding human and machine errors

Preventing hardware and software failures

Recovering from data loss

Backing up your hard drive

Restoring files

Imagine that you are driving down a steep mountain road. The condition of your brakes determines whether you get to the bottom of the mountain safely. Obviously, the right time to have your brakes checked and repaired is before you start down the mountain. After you start down the mountain, there may not be much you can do about your brakes.

Fortunately, you don't risk physical disasters with your personal computer, but you do risk losing valuable data. The time to plan for possible data loss is before it happens. If you wait until you actually lose data, it may be too late. Remember Murphy's Law: If something can go wrong, it will. When you least expect (or can afford) it, disaster strikes.

The most common cause of data loss is simple human error. A disaster also can sneak up on you as a computer malfunction, disk aging, or inconsistent electrical current. Sooner or later, you will lose important data.

The information presented in this chapter might save your invaluable data. You learn to prevent hardware and software failures, and you learn how to use the MIRROR, UNDELETE, and UNFORMAT commands to recover from lost data. You also learn how to use BACKUP and RESTORE to restore data that has been lost and cannot be recovered.

Key Terms Used in This Chapter

Surge suppressor	A protective device inserted between a power outlet and a computer's power plug. Surge suppressors help block power surges that often damage computer circuits.
Static electricity	An electrical charge that builds on an object and can discharge when another object is touched. Electronic circuits are easily damaged by static electricity discharges.
Self-parking heads	Heads on most newer disk drives that move to a position on the disk in which there is no data. These heads protect the disk from data loss when it is moved.
Head-parking program	A program that parks heads on a disk that does not have self-parking heads.
Delete tracking file	A special file, created by the MIRROR command, used by DOS to make it easier and more reliable to undelete files.
Back up	To copy files from the hard disk to floppy disks.
Restore	To copy backup copies of files on floppy disk to a hard disk.

10

Avoiding Data Loss

As you use your computer, you create files, many of which contain valuable information. Because you are very careful and today's computers are very reliable, you may be tempted to trust that these files will be there when you need them. However, as an old computer saying goes, "There are two kinds of computer users: those who have lost files, and those who are going to lose files."

You learn three techniques to avoid data loss in this chapter. The techniques are as follows:

- Minimize the chances of loss by taking preventative measures.
- Learn and use DOS commands that enable you to recover from some cases of accidental loss.
- Have a backup copy available on another disk.

When you take preventative measures, you save yourself the aggravation of losing data and the time to recover it. When you recover data, you save yourself the time to find and restore the data from a backup.

The first two techniques are not foolproof, however. The only way to ensure that a data loss is not permanent is to have another copy available. The following sections cover all three techniques.

Taking Preventative Measures To Avoid Data Loss

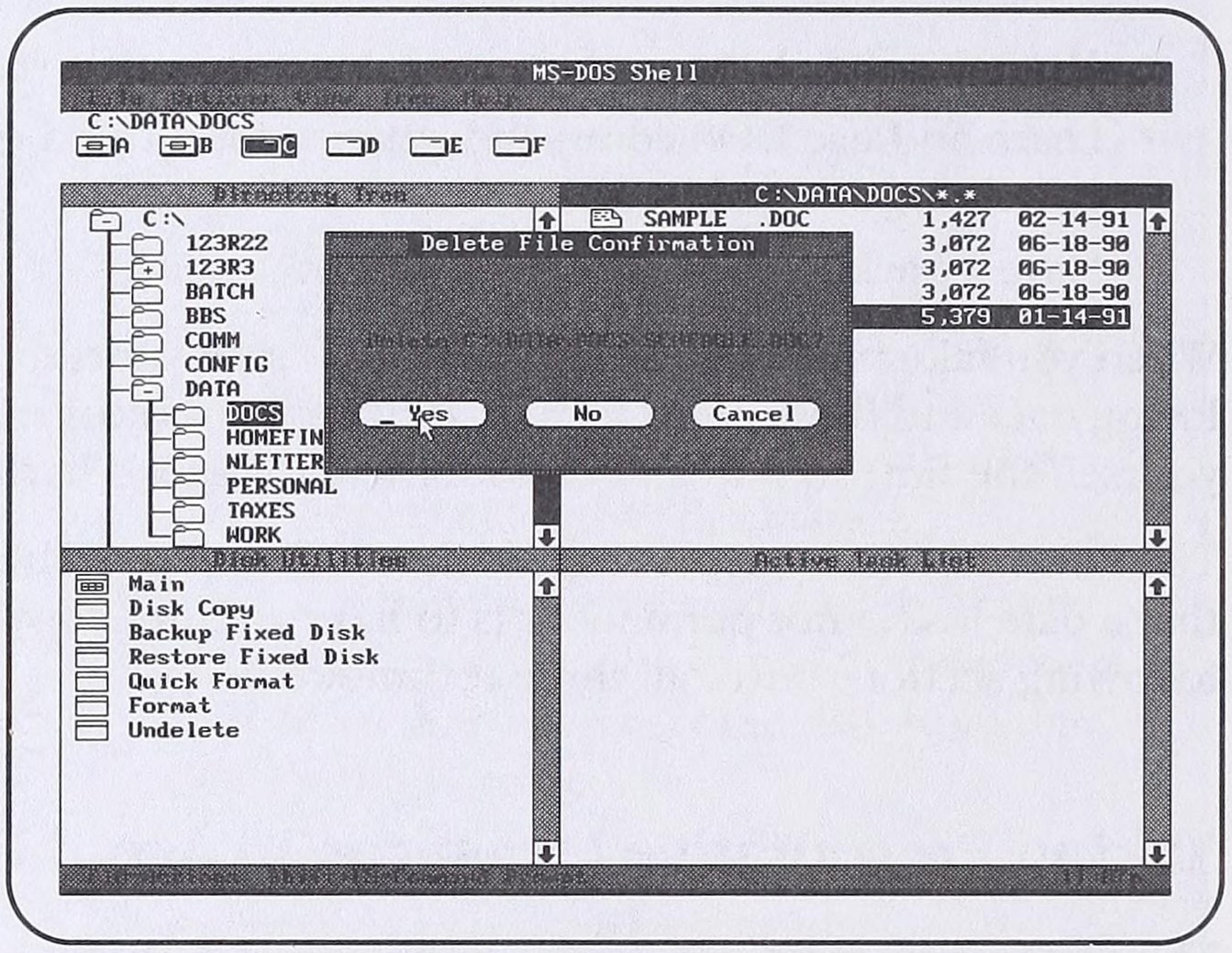
The first way to avoid data loss is to prevent it before it happens. Unfortunately, no matter what you do, it is impossible to guarantee that you will never lose data. You can minimize the risk, however, with preventative measures.

Preventing Your Mistakes

As you gain experience with your computer, you use it more. You create, copy, and erase more files. You also become a little less careful when you copy and erase files. One difference between a novice and an expert is that the expert makes many more mistakes.

Commands such as COPY, ERASE, and FORMAT perform their jobs without regard to your intentions. DOS does not know when a technically correct command will produce an unwanted effect. For this reason, always study the commands that you enter before you execute them.

With the Shell, DOS displays a confirmation dialog box each time you erase, copy, or move a file into a directory that already contains a file with the same file name. You can use the Confirmation choice in the Options menu to disable these confirmation dialog boxes, but you increase your risk of making an error.



Whether you use the command line or the Shell, it is too easy to develop a rhythm that speeds you through confirmation prompts into ruin. Pressing Ctrl-C, Ctrl-Break, or Ctrl-Alt-Del may cancel a command before it does any harm, but it may be too late.

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The most common errors that cause data loss do not occur in DOS, however. Most people spend much more time using applications programs than they spend using DOS. You can lose data in your spreadsheet, word processor, or database management system in many ways. You can, for example, issue a command that erases a large part of your forecasting spreadsheet. Then, the next time you retrieve your spreadsheet, you may find that some of your data is gone.

Just as you must exercise care when you use DOS commands, you must be just as careful when you use commands in your applications. Each application has different commands; therefore, make sure that you have copies of all your important files before you change them.

Preventing Software Failures

Each software program you buy is a set of instructions for the microprocessor. Some software packages have mistakes called *bugs*. Software bugs are usually minor and rarely cause more than keyboard lockups or jumbled displays.

Utility programs, such as disk caches and partition utilities, however, can interfere with complex programs, such as Windows. A faulty utility program can wipe out an entire hard disk. This occurrence is rare, but that is of little consolation if it happens to you.

Bugs usually occur in the first releases of programs. Most software contains version numbers. Version 1 or 1.0 is the first version of a program. Version 1.1 is a minor upgrade, and Version 2.0 is a major upgrade. Many people try to avoid Version 1 of any program. Some people avoid Version *x*.0 of any program (such as 2.0 or 3.0), because a major upgrade is also likely to have bugs.

Perhaps the best way to avoid software errors is to talk to other people about a program before you buy or use it. Talk to friends and co-workers. You can meet people at computer user group meetings and find out about their experience with the program. If the program gets good reviews, the chances of serious software errors are minimized.

Another type of software problem that can cause serious data loss is a *virus*. A computer virus is a set of computer instructions, hidden inside a program, that can take over your computer and destroy all your programs and data files. Viruses are the work of computer vandals who destroy the property of others for "fun."

A virus rarely infects commercial software. Viruses usually are found in free software distributed through electronic bulletin board systems (BBS) and passed around on floppy disk. Operators of bulletin board systems work very hard to avoid viruses, but the risk is not completely eliminated.

To practice "safe computing," never use a program that you get from someone that you do not know. Before you use any program, talk with others who have used the program and make sure that they have had no problems. Also make sure that the date and file size of both versions of the program are identical. Two "copies" of what should be the same program with different sizes is a clue that the larger one is infected with a virus.

You can obtain special programs that test your system for viruses and remove them from your software if any are found. These programs are available both commercially and from PC user groups. Even an experienced computer user calls for expert help if a computer virus is suspected. Membership in a local PC user group is a good way to have access to an expert if you need one.

Preventing Hardware Failures

Today's personal computers are reliable and economical data-processing machines. The latest generation of PCs does the work of mainframe computers that, a decade ago, only a fortunate few could access. As is true of any machine, however, computer components can break down.

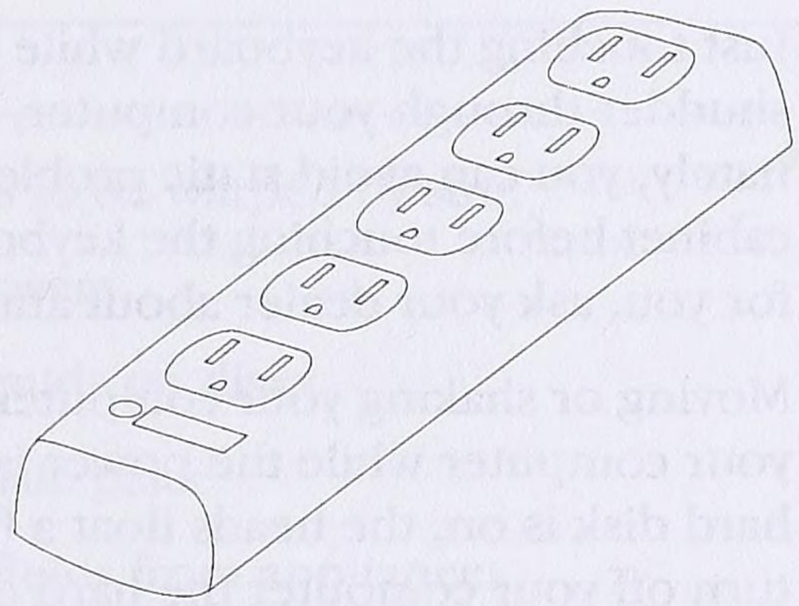
Computers contain thousands of integrated circuits. Under ideal conditions, most of these circuits can last a century or more. Disk drives incorporate precise moving parts with critical alignments. Although disk drives are very reliable, most common hardware failures occur on disk drives.

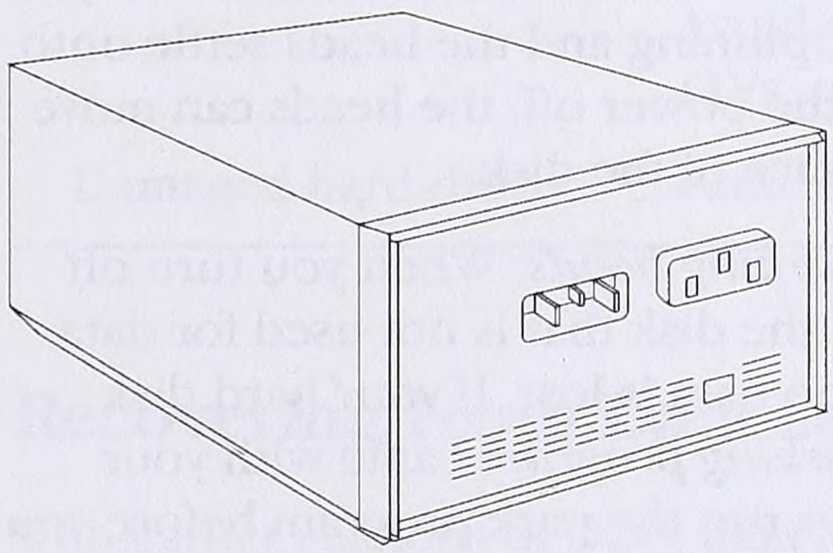
Computer hardware is vulnerable to a number of physical threats. These threats include humidity, static discharge, excessive heat, and erratic electrical power. By following the precautions presented in this section, you reduce the odds of losing time and information because of hardware failure.

You will experience hardware failure sometime. The failure may be due to the environment or to simple bad luck. A memory chip can fail for no apparent reason. A disk drive may fail in a number of different ways. The result is that you lose access to your data.

You can't overcome bad luck, but you can be vigilant about your computer's environment. A power strip with a built-in surge protector is a good start. If your power flutters and lights flicker, you probably need a line voltage regulator. Make sure that no electrical appliances near your computer pollute your power source. Connect your computer equipment to power sources not shared by copiers, TVs, fans, or any other electrical equipment that contains a motor or uses a surge of power when it is turned on.

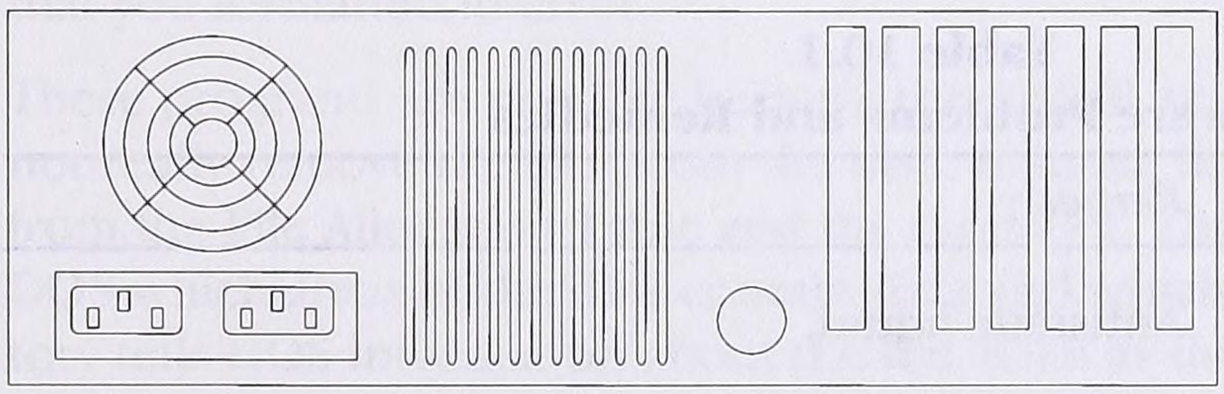
Power strips keep your cables neat and rid your work area of strings of extension cords. Power surge suppressors are built into many power strips.





Line voltage regulators remove "dips" and "spikes" in electric power lines caused either by motors turning on or by other power reducers.

Is the fan on the back of your computer choked with dust? Clean the air vents and check that your computer has room to breathe. Your computer can become erratic when the temperature climbs. Circuits are not reliable when they overheat and can cause jumbled data. To make sure that your computer can breathe, keep it cool.



Use a soft blind-cleaner attachment on your vacuum cleaner to remove the dust build-up from your computer's breathing system.

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If the outside of your computer is dusty, the inside may be full of dust, too. Remove the cover and vacuum the inside occasionally, especially the air-intake vents to the power supply.

Your body generates *static electricity* when humidity is low, when you wear synthetic fabrics, or when you walk across carpet. Static electricity appears harmless, but electronics are very sensitive to it.

Just touching the keyboard while carrying a static charge can send an electrical shudder through your computer, causing data loss or circuit failure. Fortunately, you can avoid static problems by touching your grounded system unit's cabinet before touching the keyboard. If static electricity is a serious problem for you, ask your dealer about antistatic products.

Moving or shaking your computer can damage the disk drives. Never move your computer while the power is on and the hard disk is spinning. While a hard disk is on, the heads float a fraction of an inch above the disks. When you turn off your computer the hard disk stops spinning and the heads settle onto the disks. If you move your computer with the power off, the heads can move or bounce on the disks and damage the surface of the disk.

To prevent this, most hard disks have *self-parking heads*. When you turn off your computer, the heads move to a part of the disk that is not used for data. Even if the heads damage the disk surface, no data is lost. If your hard disk does not have self-parking heads, a *head-parking program* came with your hard disk to park the heads manually. Always run the park program before you move your computer.

The heads on floppy disks can be damaged when you move your computer. To protect them, insert a floppy disk that does not contain any data and close the drive door before you move your computer.

Stopping small hardware problems before they become big ones takes a little planning and forethought. Table 10.1 lists a few simple, yet successful, preventive solutions.

Table 10.1
Hardware Problems and Remedies

Problem	*Remedy*
Static electricity	Antistatic liquid.
	Antistatic floor mat.
	"Touch Pad" on desk.
Overheating	Clean clogged air vents.
	Remove objects blocking vents.
	Use air-conditioned room in summer.
Damaged disks	Don't move the computer while the disk is running.

Problem	*Remedy*
Damaged floppy disks	Don't leave disks to be warped by sun.
	Use protective covers.
	Avoid spilling liquids on disks.
	Store disks in a safe place.
	Avoid magnetic fields from appliances (TVs, microwave ovens, etc.).
Damaged hard disks	Park the heads before you move the computer.

Recovering From Data Loss

With earlier versions of DOS, data recovery is not possible. Once you erase a file or format a disk, all the data is gone forever. In many cases, however, the data still exists on the disk, but you cannot access it.

Many utility programs were written to recover this lost data. Some of the most well-known programs were part of the Norton Utilities, Mace Utilities, and PC Tools Deluxe. Microsoft incorporated some of the utilities from PC Tools Deluxe, Version 6, into DOS 5 to provide recovery for lost data.

With these utilities, you can *undelete* a file that you erase and *unformat* a disk that you formatted in error.

These programs are possible because the ERASE and FORMAT commands do not really remove the files from the disk. Instead, they clear the information from the File Allocation Table and the directory. The File Allocation Table tells DOS which areas of the disk contain data and which are available. The directory tells DOS information about the file, such as the file name and size.

After you erase a file or format a disk, all the files are still on the disk, but the space is freed by DOS so that the next time you create a file, DOS can write over these files. Therefore, if you want to recover a file, you must do it immediately, before the disk space is used again to write another file.

Some lost data cannot be recovered. If you copy a file to a disk or subdirectory that already contains a file with that name, the old file is overwritten and is lost. If you save a file in an application program with the same name as an existing file, the program may give you a warning message. If you override the warning and save the file, the old file is overwritten and is lost. Your only recourse is to restore a backup copy.

Using MIRROR to Prevent Data Loss

The MIRROR command does not recover lost data, but it saves information about your disks to make it easier for DOS to recover lost data. The MIRROR command provides two separate facilities to prevent data loss. You can use MIRROR as follows:

- Make a copy of the File Allocation Table and directory. If this area of the disk becomes damaged, the copies of these two system areas can be used to recover the information on the disk with the UNFORMAT command.
- Create a delete tracking file that keeps track of every file you erase. With this file, you can undelete files easily and reliably.

You must run MIRROR from the command line. The syntax for the MIRROR command is as follows:

MIRROR [*drive***1:] [**drive2**:...] [/t**drive1**] [/t**drive2**...]**

If you specify a drive1, such as

MIRROR C:

DOS saves the File Allocation Table and directory for the specified drive. If you do not specify a drive, DOS saves the File Allocation Table and directory for the current drive. You can specify multiple drives as follows:

MIRROR C: D:

This command saves the File Allocation Table and directory for both drives C and D. To start a delete tracking file for a drive, specify the drive or drives using the /t switch as follows:

MIRROR C: D: /tC /tD

This command saves the File Allocation Table and directory and sets up a delete tracking file for both drives C and D.

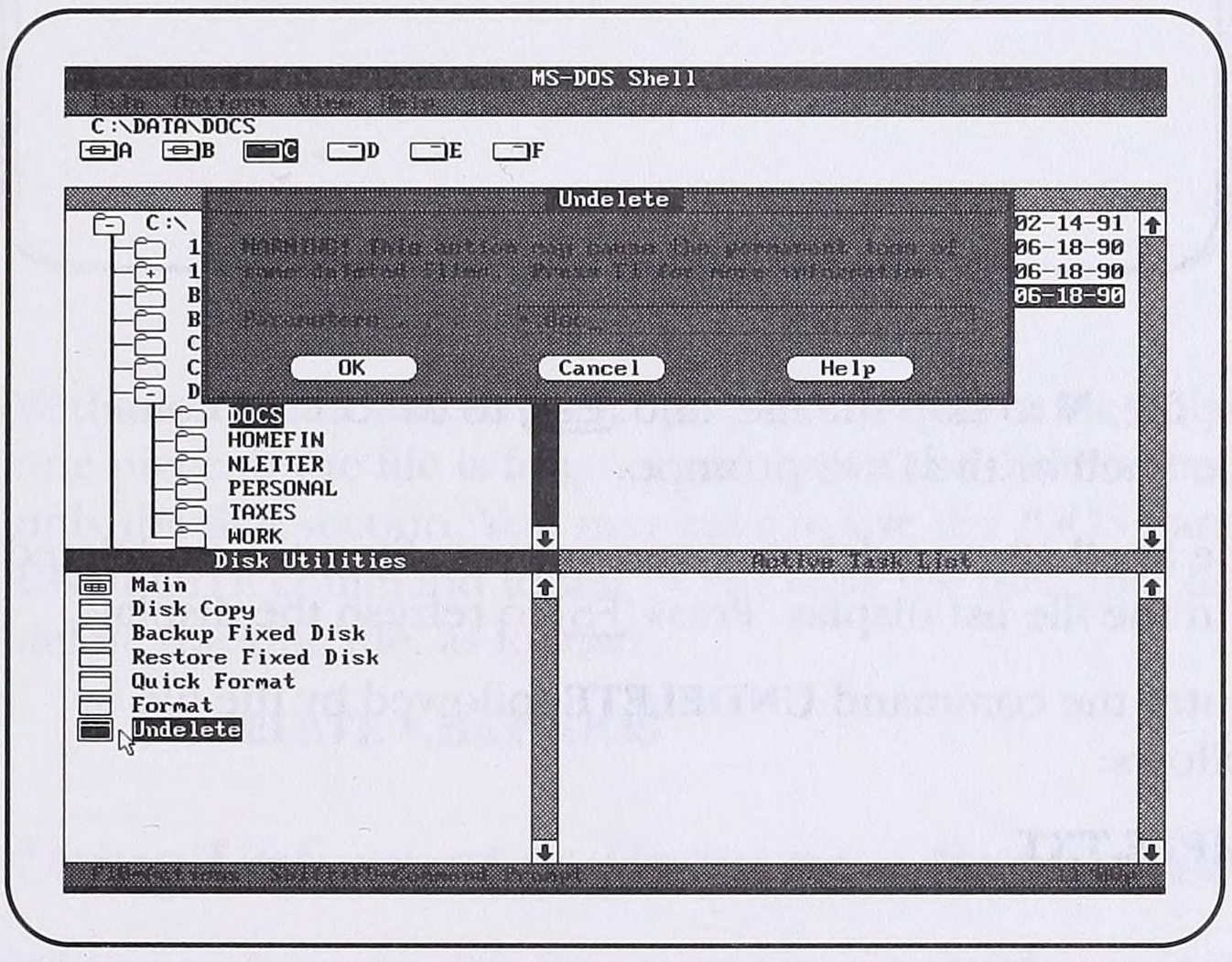
You should install delete tracking every time you boot your computer. The best way to ensure that you have delete tracking enabled is to put the MIRROR command in your AUTOEXEC.BAT file. The AUTOEXEC.BAT file is explained in Chapter 12.

Additional MIRROR options are discussed in the command reference in Chapter 14.

Using Undelete to Recover a Deleted File

If you delete a file or group of files in error, you may be able to recover the file if you use the UNDELETE command immediately. Remember, when you tell DOS to delete a file, the area on the disk that contains that file is marked as available. The next time you write a file to the disk, DOS may use this part of the disk for the new file and the deleted file can no longer be recovered.

If you delete a file after you have run MIRROR to install delete tracking, it is very easy to undelete the file. From the Shell, choose Undelete from the Disk Utilities Program Group.



When you choose Undelete from the Disk Utilities Program Group, DOS displays the Undelete dialog box.

The default parameter is /LIST, which lists the files in the delete tracking file but does not undelete any files. To undelete one or more files, ignore the default and enter the name of the file to undelete. You can use wild cards, such as ***.BAT**, to undelete all deleted batch files in the current directory.

Whether you execute UNDELETE from the Shell or the command line, DOS displays an analysis of files that are available to undelete and a prompt to undelete each file.

```
Directory: C:\DATA\DOCS
File Specifications: *.DOC

    Deletion-tracking file contains    1 deleted files.
    Of those,    1 files have all clusters available,
                 0 files have some clusters available,
                 0 files have no clusters available.

    MS-DOS directory contains    1 deleted files.
    Of those,    1 files may be recovered.

Using the deletion-tracking file.

     SCHEDULE DOC     5379  1-14-91  2:53p  ...A  Deleted:  3-08-91 11:08p
All of the clusters for this file are available. Undelete (Y/N)?y

File successfully undeleted.

                                        Press any key to return to MS-DOS Shell
```

Press **Y** to undelete the file, **N** to skip the file, and Esc to cancel the command and return to the Shell or the DOS prompt.

When you return to the Shell after undeleting one or more files, the undeleted files are not included in the file list display. Press F5 to refresh the display.

At the DOS prompt, enter the command **UNDELETE** followed by the file or files to undelete, as follows:

UNDELETE SAMPLE.TXT

or

UNDELETE *.BAT

If you do not have a delete tracking file for a disk and you delete a file in error, you may be able to undelete the file. When a file is deleted, the information still exists in the directory, but the first letter of the file name is changed to an asterisk (*). If you try to undelete a file without a delete tracking file, DOS lists the deleted files in the current directory with a question mark (?) in place of the first character and asks whether you want to undelete each one. If you press **Y**, DOS prompts you for the first character of the file name.

```
Directory: C:\DATA\DOCS
File Specifications: *.*

    Deletion-tracking file contains    0 deleted files.
    Of those,    0 files have all clusters available,
                 0 files have some clusters available,
                 0 files have no clusters available.

    MS-DOS directory contains    1 deleted files.
    Of those,    1 files may be recovered.

Using the MS-DOS directory.

      ?CHEDULE DOC     5379  1-14-91  2:53p  ...A  Undelete (Y/N)?y
      Please type the first character for ?CHEDULE.DOC: s

File successfully undeleted.

                                  Press any key to return to MS-DOS Shell
```

To undelete a file without a delete tracking file, you must supply the first character of the file name.

Without a delete tracking file, you can recover a file only if it is on the disk in one piece. If the file is fragmented, or on the disk in sections, DOS can recover only the first section. You may have to use the /DOS parameter after the UNDELETE command to tell DOS to use the directory listing when there is no delete tracking file, as follows:

```
UNDELETE *.BAT /DOS
```

Using Unformat to Recover a Formatted Disk

When you format a disk that contains data, DOS saves information about the files on the disk before it clears the File Allocation Table and directory. If you format a disk in error and do not write any new files to the disk, you can use UNFORMAT to recover the files of the disk.

When you format a disk, DOS saves the information needed to UNFORMAT the disk later, provided that you do not put any files on the disk.

```
SAMPLE   DOC      1427 02-14-91   3:24a
SAMPLE   TXT      3072 06-18-90  11:41a
       2 file(s)       4499 bytes
                    1209344 bytes free

C:\DATA\DOCS>format a:
Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format
Saving UNFORMAT information
Verifying 1.2M
Format complete

Volume label (11 characters, ENTER for none)?

   1213952 bytes total disk space
   1213952 bytes available on disk

       512 bytes in each allocation unit
      2371 allocation units available on disk

Volume Serial Number is 3021-16F1

Format another (Y/N)?
```

The syntax for the UNFORMAT command follows:

UNFORMAT *drive*:

Additional UNFORMAT options are listed in the command reference in Chapter 14.

Make sure that you UNFORMAT a disk immediately after you format the disk in error and before you write any files on the disk. After you write files on a disk, the information that used to be on the disk is lost.

10

After the UNFORMAT command, you must confirm that you want to proceed, then DOS recovers the files on the formatted disk.

```
Searching disk for MIRROR image.

The last time the MIRROR or FORMAT command was used was at 15:41 on 03-10-91.

The MIRROR image file has been validated.

Are you sure you want to update the system area of your drive A (Y/N)? y

The system area of drive A has been rebuilt.

You may need to restart the system.

C:\DATA\DOCS>dir a:

 Volume in drive A has no label
 Volume Serial Number is 3739-16EF
 Directory of A:\

SAMPLE   DOC      1427 02-14-91   3:24a
SAMPLE   TXT      3072 06-18-90  11:41a
       2 file(s)       4499 bytes
                    1209344 bytes free

C:\DATA\DOCS>
```

When FORMAT saves the UNFORMAT information, it runs MIRROR on the disk before it formats the disk. This process is called "safe formatting." UNFORMAT then uses the MIRROR information to unformat the disk.

Restoring From Backup Copies

Remember that you can take measures to prevent data loss, and in some cases you can recover from data loss, but these measures are not foolproof!

The *only* way to avoid data loss is to make sure that you always have a backup copy of every file.

The most important data-protection measure you can take is learning to make backup copies of all your disk files.

It is a good idea to use DISKCOPY to copy every disk that comes with any new software that you buy, even before you install it on your hard disk. Whenever you create or change a very important data file, immediately copy it to a floppy disk. You learned how to use COPY and DISKCOPY in Chapter 7. To back up all your data for safekeeping, use BACKUP and RESTORE.

BACKUP and RESTORE have several advantages over COPY and DISKCOPY to back up all your data:

- You can back up an entire disk or directory structure with one command.
- You can back up files that are larger than the capacity of your floppy disks.
- You can back up only those files that were created or changed since the last time you ran BACKUP.
- You need fewer floppy disks.

The rest of this chapter covers the BACKUP and RESTORE command techniques. With the examples in this chapter, you learn to back up and restore your entire hard disk or selective directories and files. You also learn the various switches to use to adapt BACKUP and RESTORE to your particular needs.

The BACKUP and RESTORE commands are effective insurance against file loss. You can protect against the loss of hours or weeks of work through methodical use of the BACKUP command to make backup disks of your files. Of course, you also should master the complement to BACKUP, the RESTORE command. RESTORE uses your backup disks to replace files lost from your hard disk.

Many companies have devised stand-alone backup software packages. These packages are easier to learn than the DOS utilities. They also execute much faster and require fewer floppy disks. In time, you may purchase one of these packages and scoff at BACKUP and RESTORE. Nevertheless, until you do, you should understand these important DOS utilities.

In theory, all backup software serves the same purpose. If you understand the benefits and the dangers native to each command and in each package, you can reliably use these utilities.

If you have not yet tried to back up disk files, or if you are learning your way around DOS, the rest of this chapter is important. If you apply this information, you may never experience the shock that comes to those who lose files.

Preparing for the Backup

DOS or your computer may have several different methods available to back up your files. Your computer, for example, may have a tape backup unit as part of its peripheral hardware. The methods for backing up files to tape also vary. You should know how to create and manipulate disk-based backups, however, in case you need to restore files to a computer that is not equipped with a tape backup.

With a single BACKUP command, you can back up an entire fixed disk. You also can use switches and parameters to make partial backups of the disk, backing up only selected files. You can select files by time, date, directory, activity, or file name.

Full Backup Considerations

A full backup makes backup copies of all files on the hard disk. BACKUP does not copy the hidden, system files, or COMMAND.COM, however. A full backup transfers the complete contents of your fixed disk onto backup disks.

How Often To Back Up Hard Disks

Performing a complete backup about once a week is a good habit. If you do not regularly schedule partial backups to copy your most important files, do a complete backup more often.

On any day, ask yourself, "If my hard drive failed today, how much data would I lose?" It is easier to perform a backup than to try to reconstruct lost data. DOS does not prompt you to make backups. The decision is yours—let your conscience guide you. Remember, it's your data.

Preparing Backup Floppies

Before you perform a complete backup, make sure that you have enough floppy disks to hold all of the files on your hard disk. You don't want to stop halfway through a backup to run to the computer store to buy more disks!

```
C:\DATA\DOCS>chkdsk

Volume DRIVE_C     created 10-03-1990 3:45p
Volume Serial Number is 1650-7DB2

  27553792 bytes total disk space
     75776 bytes in 3 hidden files
    106496 bytes in 47 directories
  23617536 bytes in 975 user files
     20480 bytes in bad sectors
   3733504 bytes available on disk

      2048 bytes in each allocation unit
     13454 total allocation units on disk
      1823 available allocation units on disk

    655360 total bytes memory
    578064 bytes free

C:\DATA\DOCS>
```

To determine how many megabytes of files are on your disk, use the CHKDSK command. The CHKDSK command is explained in more detail in Chapter 11. Divide the number of bytes by 1,000,000 to find out the number of megabytes.

When you know the approximate number of megabytes, you can use table 10.2 to estimate the number of disks you need. If you run out of disks, you can stop the backup by pressing Ctrl-C.

Table 10.2
Floppy Disks Needed for Backup

Megabytes	*Disk Capacity*			
	360K	*720K*	*1.2M*	*1.44M*
10M	29	15	9	8
20M	59	29	18	15

continues

Table 10.2 *(continued)*

Megabytes	*Disk Capacity*			
	360K	*720K*	*1.2M*	*1.44M*
30M	83	44	27	22
40M	116	58	35	29
70M	200	100	60	50

One drawback to backing up a hard drive is the time it takes. But the hours, days, and often weeks of work you may one day save make that time well spent.

If you want, you can format the disks first. Do not use the /S switch when you format the disks. The /S switch decreases the available space on floppy disks. If you use unformatted disks, DOS formats each disk during the backup, but this takes more time. Next, you should number each disk consecutively. BACKUP copies disks in sequential order so that RESTORE can put the files back on your hard disk in the proper order.

Although you can use older disks that contain files you don't want to keep, BACKUP overwrites old files only in the root directory. If you have an old disk with subdirectories, you should use Quick Format to clear all the files on the disk before you use the disk for BACKUP.

10

Choose a regular interval to do a backup. Back up once each week or more often if you frequently change many files.

JANUARY						
1	2	3	4	5	BACK UP	7
8	9	10	11	12	BACK UP	14
15	16	17	18	19	BACK UP	21
22	23	24	25	26	BACK UP	28
29	30	31				

Get into the habit of performing a backup at least once a week, such as every Friday. Mark the dates on the calendar as a memory jogger. For very important files, use COPY or BACKUP to make a backup copy every time you change them.

Before you start the back up procedure, follow these steps in preparation:

1. Estimate how full your hard disk is.
2. Determine how many floppy disks you need for a backup (see table 10.2).
3. Make sure that you have enough floppy disks available to complete the backup.

The next section explains the actual backup procedure. Remember that BACKUP is half of a useful pair of commands. The other half, RESTORE, retrieves files copied with BACKUP.

Issuing the BACKUP and RESTORE Commands

The BACKUP command can copy files selectively from your hard disk to the destination floppy disk. The internal format of the backed-up file on the floppy is different from normal files. Therefore, you cannot use COPY to retrieve files stored on a backup disk. Your computer can use the files produced by BACKUP only after you run them through the RESTORE program.

Syntax for BACKUP

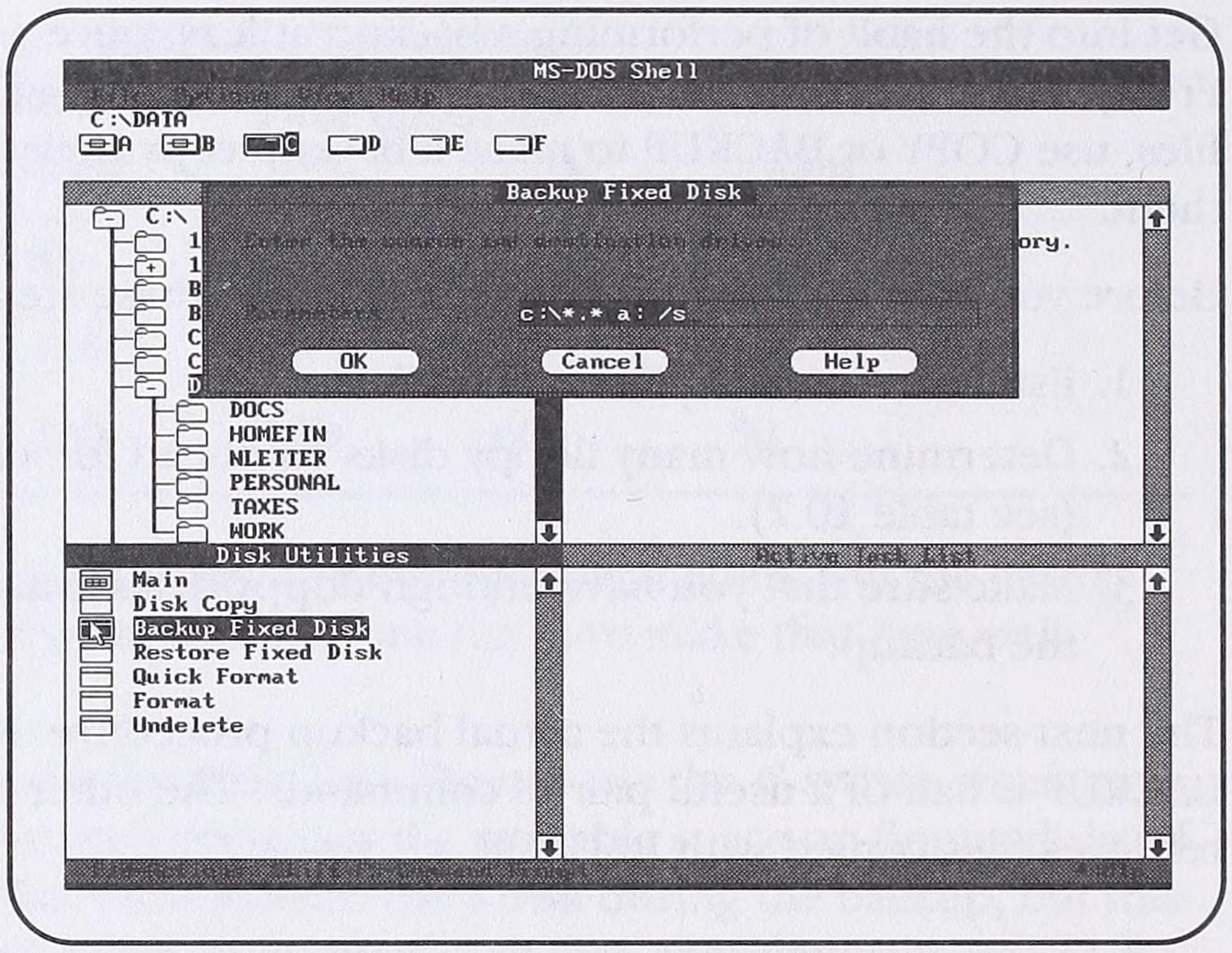
BACKUP can be a complex command to master because it has many options. You can execute BACKUP from the Shell or the command line.

The syntax for the BACKUP command is as follows:

BACKUP *sd:spath\sfilename.ext dd: /switches*

Sd: is the letter of the drive containing the source disk. This drive is usually drive C. *Spath* is the path to the files you want to make backup copies of. *Sfilename.ext* is the full file name of the file(s) you want to back up. Full file names may contain wild cards for selective backup of matching files. The *dd:* notation refers to the drive that receives the backup files. */switches* are optional switches that modify the basic BACKUP command.

Choose Backup Fixed Disk from the Disk Utilities Program Group to execute BACKUP from the Shell. The Parameters box defaults to a full backup of drive C to drive A, as explained in the next section. Choose OK to start the backup.



You must specify the same parameters whether you execute the program from the command line or the Shell.

Full Backup

The full backup puts all files on your backup floppies. To do a full backup of drive C to drive A from the command line, enter the following command:

BACKUP C:*.* A:/S

This command tells DOS to back up all files in the root directory, and to include all subdirectories (the /S switch). DOS prompts you to insert and change disks.

When you do a full backup from the Shell, you can use the default parameters. Just choose OK in the dialog box.

Always put the backup date on the disks for future reference. Put the backup disks in the proper sequence and store the disks in a safe place.

Selective Backups

By specifying source directory paths, wild card file names or extensions, and switches, you can select specific files to back up. Selective backups are useful when just some of your data changes between full backups, or if you move specific files from one computer system to another.

Specifying Selected Directory and File Names

BACKUP always starts in the directory you specify in the source path. If you place a directory name in the path at a point in the tree other than the root directory, you can back up files in that directory (and its subdirectories with /S). To back up all files in the C:\DATA directory and all subdirectories, enter the following command:

```
BACKUP C:\DATA\*.* A:/S
```

In the Shell, use the same parameters in the dialog box.

```
C:\DATA>BACKUP C:\DATA\*.* A: /S

Insert backup diskette 01 in drive A:

WARNING! Files in the target drive
A:\ root directory will be erased
Press any key to continue . . .

*** Backing up files to drive A: ***
Diskette Number: 01

\DATA\DOCS\SAMPLE.DOC
\DATA\DOCS\SAMPLE.TXT
\DATA\DOCS\SAMPLE2.TXT
\DATA\DOCS\SAMPLE3.TXT
\DATA\DOCS\SCHEDULE.DOC
\DATA\TAXES\CHECKS.WK1
\DATA\TAXES\INCOME.WK1
\DATA\TAXES\LOG.DOC
\DATA\TAXES\SAMPLE.WK1
\DATA\TAXES\STATEMNT.WK1
\DATA\TAXES\TAXEST.WK1

C:\DATA>
```

Whether you execute BACKUP from the command line or the Shell, you see the same messages.

You can add further selectivity by using wild cards in the file name. To back up all files that have the extension DOC in the DATA directory and subdirectories, for example, enter the following command:

```
BACKUP C:\DATA\*.DOC A:/S
```

Adding Other Switches

The /M (modified) switch selects only those files that have changed since the last backup. The /D and /T switches select files based on date and time.

You can enter a date and time after the appropriate switch, using the same formats you use for the DATE and TIME commands. Files changed on or after a specified date and time are included in the backup. The /A switch adds files to a backup disk series and leaves the existing backup files intact.

If the destination disk is not formatted, DOS automatically formats the disk. If the disk does not match the maximum capacity of the drive, however, DOS will format the disk incorrectly. If, for example, you have a 1.2 megabyte floppy drive and you use an unformatted 360K disk, DOS will try to format the disk as a 1.2M disk. To avoid this problem, use the /F switch and specify the size of the disk in the drive. To use an unformatted 360K disk in a 1.2M drive, use the following parameter:

```
/F:360
```

To use an unformatted 720K disk in a 1.44M drive, use this parameter:

```
/F:720
```

The size switch for formatting is explained in more detail in Chapter 6. Table 10.3 lists the switches available with the BACKUP and RESTORE commands.

Table 10.3
BACKUP and RESTORE Switches

Switch	*Description*
BACKUP	
/S	Backs up subdirectories of the initial directory.
/M	Selects files that were created or changed since the last BACKUP command.
/D:*date*	Selects files based on the date.
/T:*time*	Selects files based on the time and date.
/L:*file*	Creates a log file with the file name you specify with information about the backup.
/F:*size*	Formats the target disk if it is not formatted and the disk does not match the maximum capacity of the drive.
/A	Adds new files to a backup disk series, but leaves the existing backup files intact.
RESTORE	
/S	Restores subdirectories of the initial directory.
/P	Prompts you to restore the file if it is marked as read-only or has been changed since the last backup.

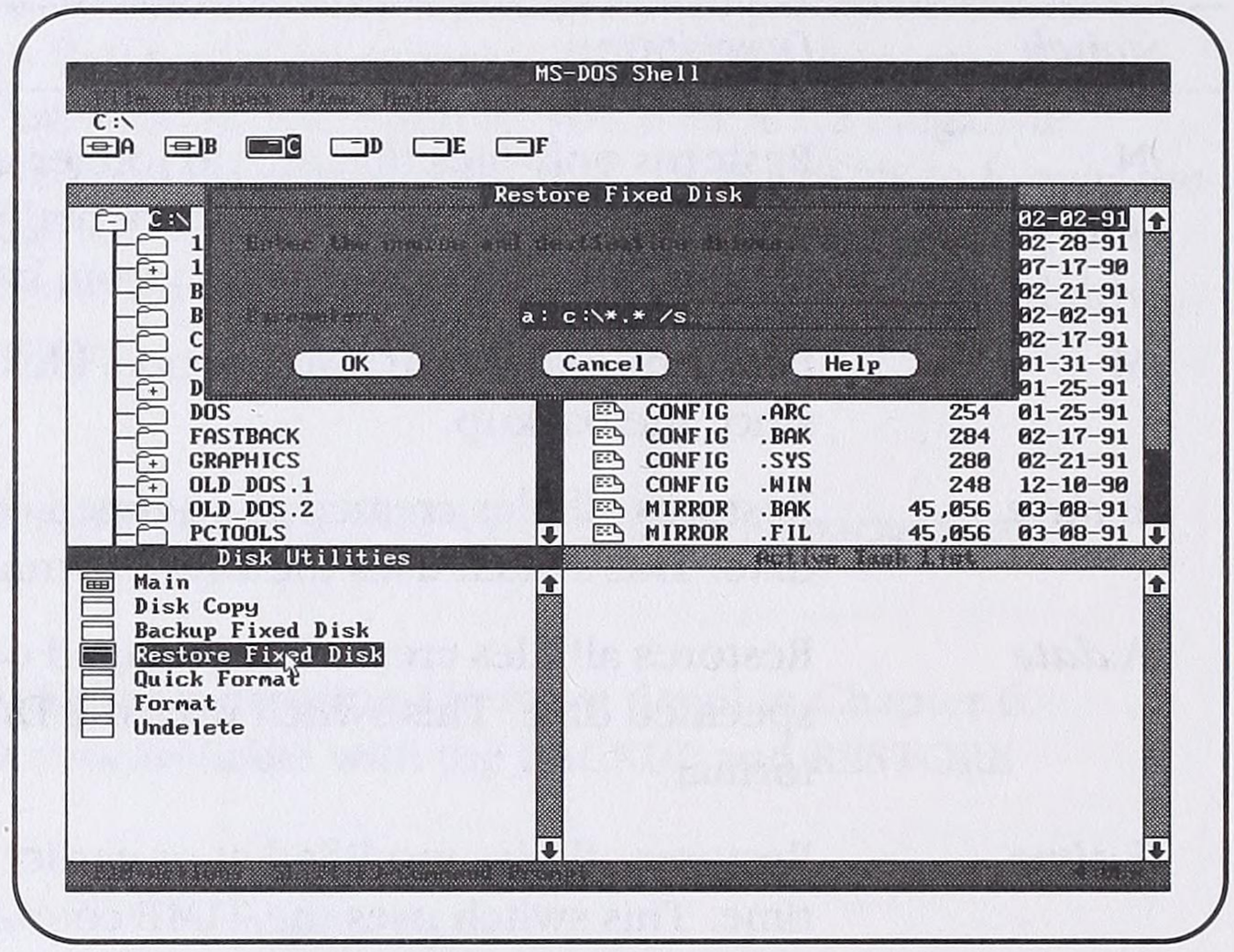
Switch	*Description*
/N	Restores only files that are no longer on the hard disk. This switch is useful if you accidentally deleted hard disk files and need to restore them from backups.
/M	Performs like /N but also restores files that have changed since the backup.
/B:*date*	Restores all files created or changed on or before the date. This switch uses the DATE command format.
/A:*date*	Restores all files created or changed on or after the specified date. This switch uses the DATE command format.
/E:*time*	Restores all files modified at or earlier than the specified time. This switch uses the TIME command format.
/L:*time*	Restores all files modified at or later than the specified time.

Syntax for RESTORE

The partner command to BACKUP is the DOS external command RESTORE. RESTORE is the only command that copies backed-up files to the hard disk. RESTORE's syntax is similar to BACKUP's syntax:

RESTORE *sd: dd:\dpath\dfilename.ext /switches*

Sd: refers to the source drive; that is, the name of the drive holding the files you want to restore. The *dd:* is the hard disk you want to restore to (usually drive C). D*path* represents the directory on the hard disk that receives the restored files. Files on the backup floppies that didn't come from the *dpath* are not restored. D*filename.ext* is the file name for the file(s) to be restored. You can use wild cards in the file name to select specific files. */switches* stands for the optional switches you can add to gain further selectivity with the RESTORE command.



Choose Restore Fixed Disk from the Disk Utilities Program Group to execute RESTORE from the Shell. The Parameters box defaults to a full restore of drive C from drive A. Choose OK to start the backup.

You must specify the same parameters whether you execute the program from the command line or the Shell.

Full Restore

The full restore copies all the files on the backup disks to the hard disk. To do a full restore of drive C from drive A from the command line, enter the following command:

```
RESTORE A: C:\*.* /S
```

This command tells DOS to RESTORE all files in the root directory and to include all subdirectories (/S switch). DOS prompts you to insert and change disks.

When you do a full restore from the Shell, you can use the default parameters; just choose OK in the dialog box.

Selective Restores

By specifying source directory paths, wild card file names or extensions, and switches, you can select specific files to restore. Selective restores are useful when only one or a few files were destroyed, or you want to restore them to a different computer.

Restoring One File

You can choose to restore a single file by using a complete path and file name in the command. As in all selective restores, DOS prompts you to insert sequential disks until it locates the specified file.

Suppose that you want to restore the file \DATA\TAXES\CHECKS.WK1 from the backup disk. The proper command is

```
RESTORE A: C:\DATA\TAXES\CHECKS.WK1
```

Restoring Selected Directories and File Names

You can choose to restore more than one file. If, for example, you want to restore all files with a WK1 extension to the \DATA\TAXES directory, use the following command:

```
RESTORE A: C:\DATA\TAXES\*.WK1
```

The wild card *.WK1 selects all files with the WK1 extension from the DATA\TAXES directory. If you want to restore all files in a directory, and all subdirectories below the directory, use the /S switch. The command

```
RESTORE A: C:\DATA\*.* /S
```

restores all files in directories subordinate to the \DATA directory.

The following directory trees show the results of using selective BACKUP and RESTORE commands. Note that when you use the RESTORE command in the same way as the BACKUP command, RESTORE acts on the same files.

Avoiding DOS Version Conflicts

Beginning with Version 3.3, DOS has a different method for producing the contents of a backup disk. DOS Versions 3.3 and later can restore files that you backed up with previous versions of DOS. Versions earlier than 3.3, however, cannot restore backups made with versions 3.3, 4.*x*, or 5.

Although you cannot restore backed-up files from newer versions of DOS on computers running early versions of DOS, you can use COPY to move the files. Be careful when you use RESTORE or COPY to copy files from one computer to another computer running another version of DOS. Make sure that you do not copy any of the files in the /DOS directory. Each version of DOS has its own set of DOS files and you cannot execute a command from one version of DOS on a computer running another version of DOS.

If you have a computer running MS-DOS 3.3, for example, and you copy the files from the /DOS directory of a computer that runs DOS 5, you get an error message every time you run an external command, such as CHKDSK, BACKUP, or RESTORE.

This problem occurs most often when you do a full backup on one computer and a full restore on another computer that runs a different version of DOS. The full RESTORE copies all the files except the hidden system files that make up the part of DOS you load into memory when you boot. This process results in a mismatch of DOS files and you get errors when you try to run external DOS commands.

Lessons Learned

- You can make mistakes that result in the loss of valuable data.
- At times, your computer hardware can fail, resulting in the loss of valuable data.
- You can avoid some hardware and software failures.
- If you use MIRROR, you have a better chance of recovering lost files.
- You can undelete files you delete in error.
- You can unformat disks that you format in error.
- The only sure way to avoid data loss is to have a backup copy of all your files.
- DOS's BACKUP utility enables you to make an exact backup of your hard disk drive.
- DOS's RESTORE utility enables you to restore several files or the entire contents of your hard disk drive.

DOS provides utilities that supply valuable information and services with just a few simple keystrokes. It's time to review some of DOS's "nifty helpers."

11

Other Commands

One of the most intimidating areas of DOS is handling the hundreds of files contained on a hard disk. When you first sat at a keyboard, you probably felt that manipulating this hodgepodge of DOS programs was beyond the grasp of all but the most fanatical enthusiast.

Although DOS contains dozens of commands, some are more useful than others. Many long-time DOS users rarely exploit more than a fraction of DOS's commands. The preceding chapters covered the DOS commands that are most critical to using your computer. This chapter looks at some of the more common other DOS commands that can make your life a little easier.

You can "get by" without using these commands, but once you feel comfortable with the basics, you will find these commands to be handy helpers.

Viewing the contents of files

Locating a file

Getting a DOS report on available memory

Using the CHKDSK command

Viewing and changing disk volume labels

11

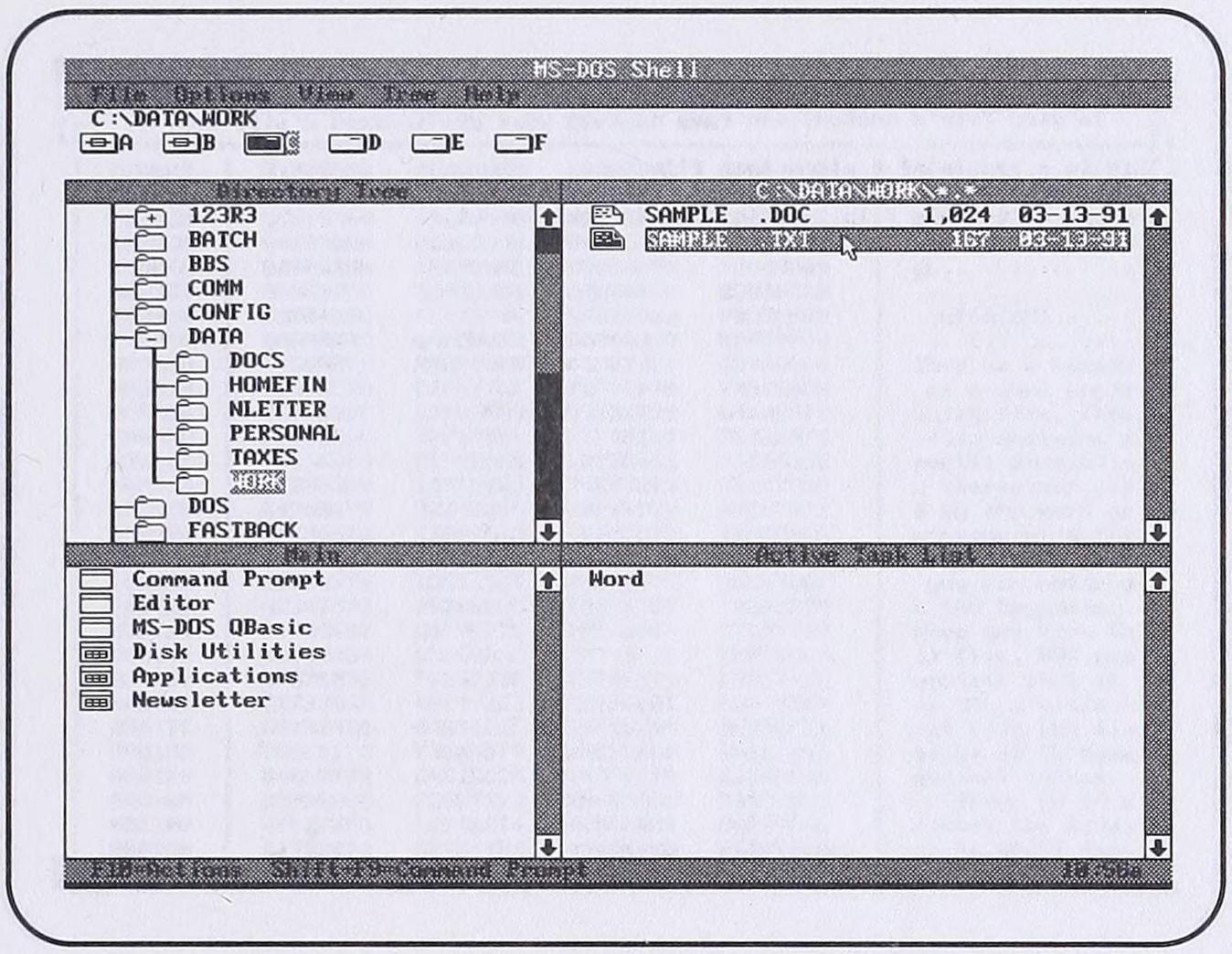
Key Terms Used in This Chapter

ASCII file	A file whose contents are alphanumeric and control characters, which can be text or other information that can be read by you.
Hexadecimal	A way to display binary codes used by computers. Except for computer programmers, humans do not use hexadecimal displays.
Lost clusters	Information on the disk that is lost to you because DOS has lost their directory entries.
Fragmentation	One or more files that are physically spread over two or more separate parts of the disk. Fragmentation slows down disk operations.
Noncontiguous	Not together. If a file is fragmented, then it contains one or more noncontiguous blocks.
Defragment	To remove disk fragmentation so that every file on the disk is on one contiguous block.

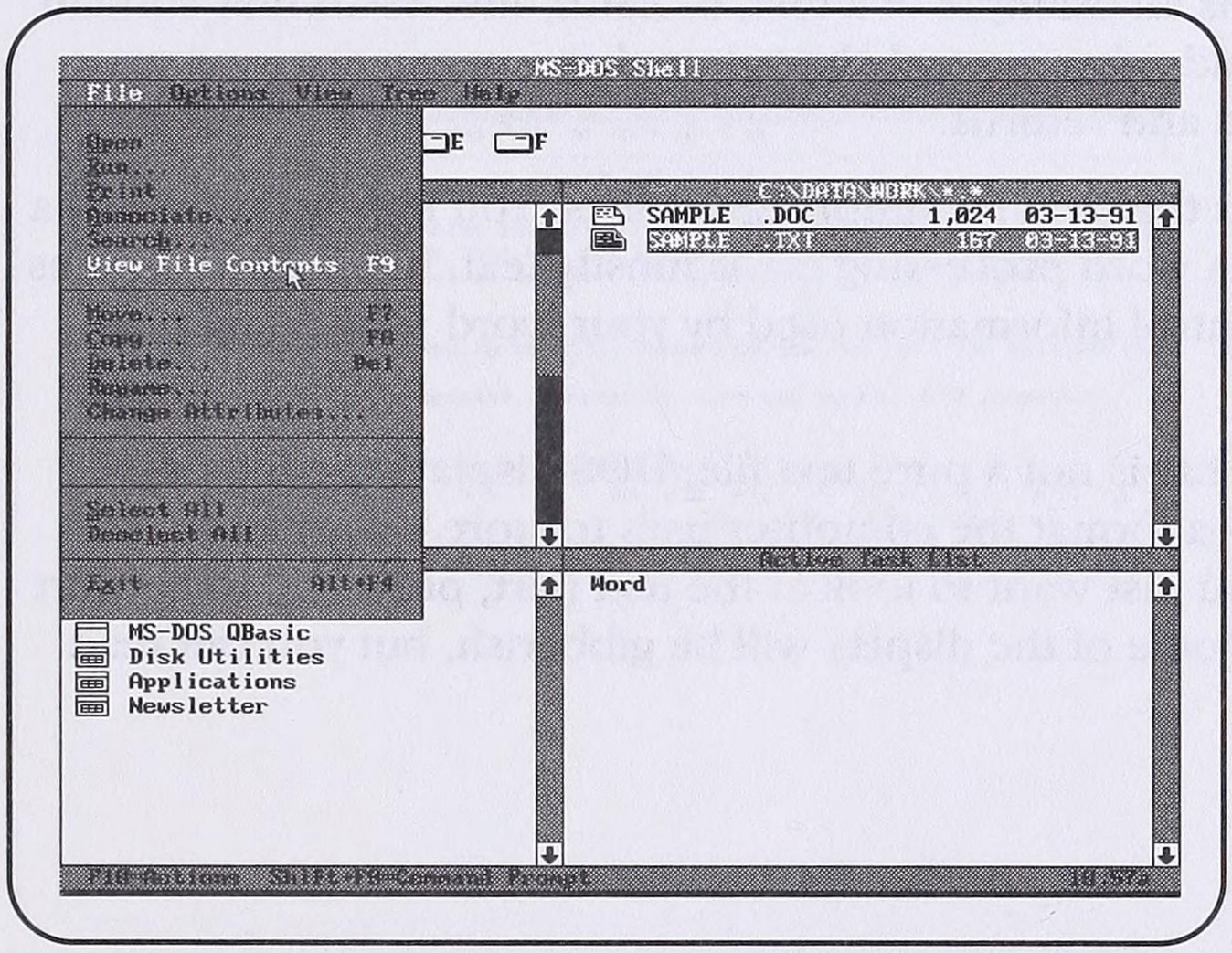
Viewing File Contents

The DOS Shell contains a handy command to view the contents of files. You can view batch files, explained in Chapter 12, and other text files.

To view the contents of a file, first select the disk and then the directory that contains the file you want to view. You then select the file from the File List.

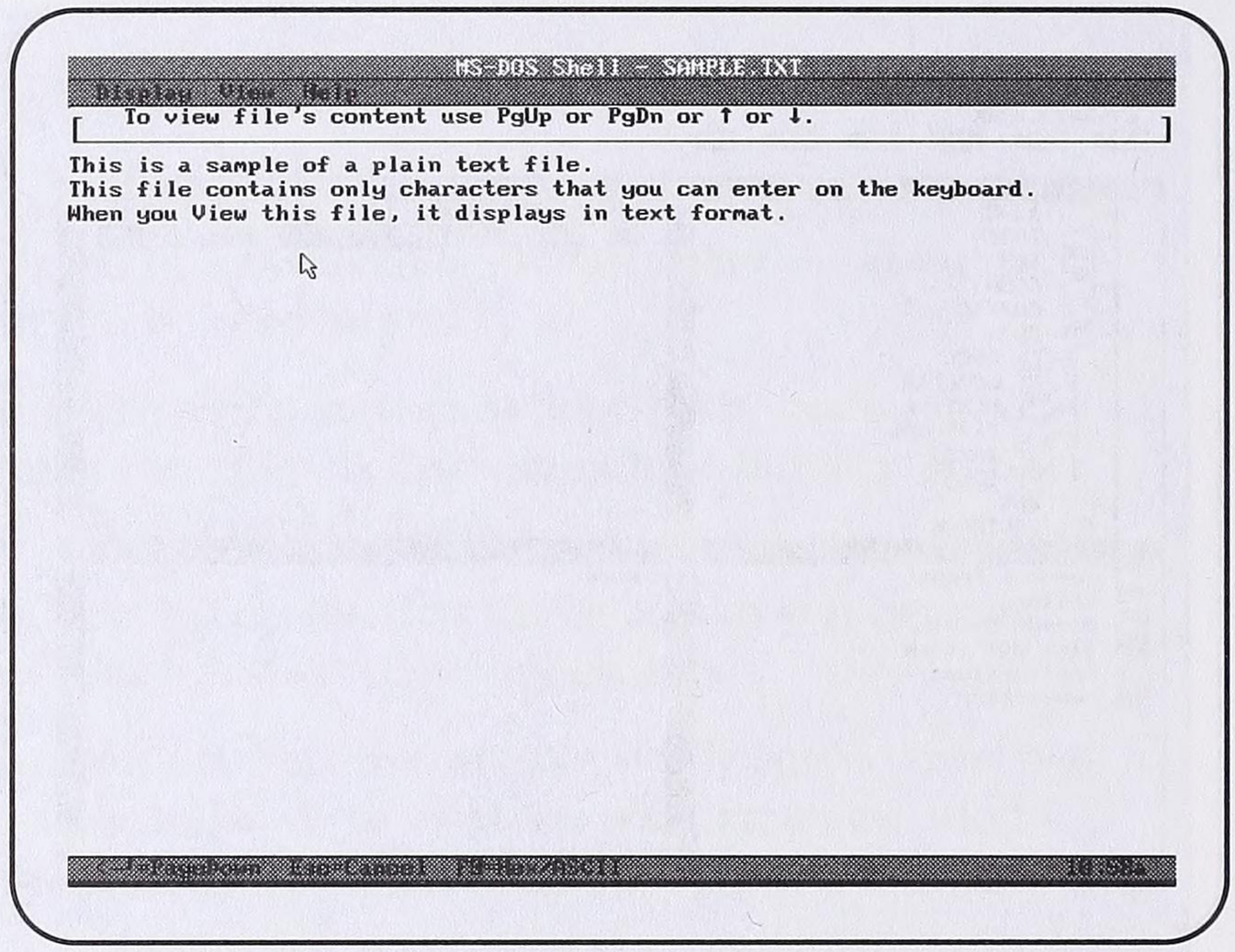


In this example, you see the SAMPLE.TXT file selected.



From the File menu, select View File Contents. As a shortcut, press the F9 key.

11

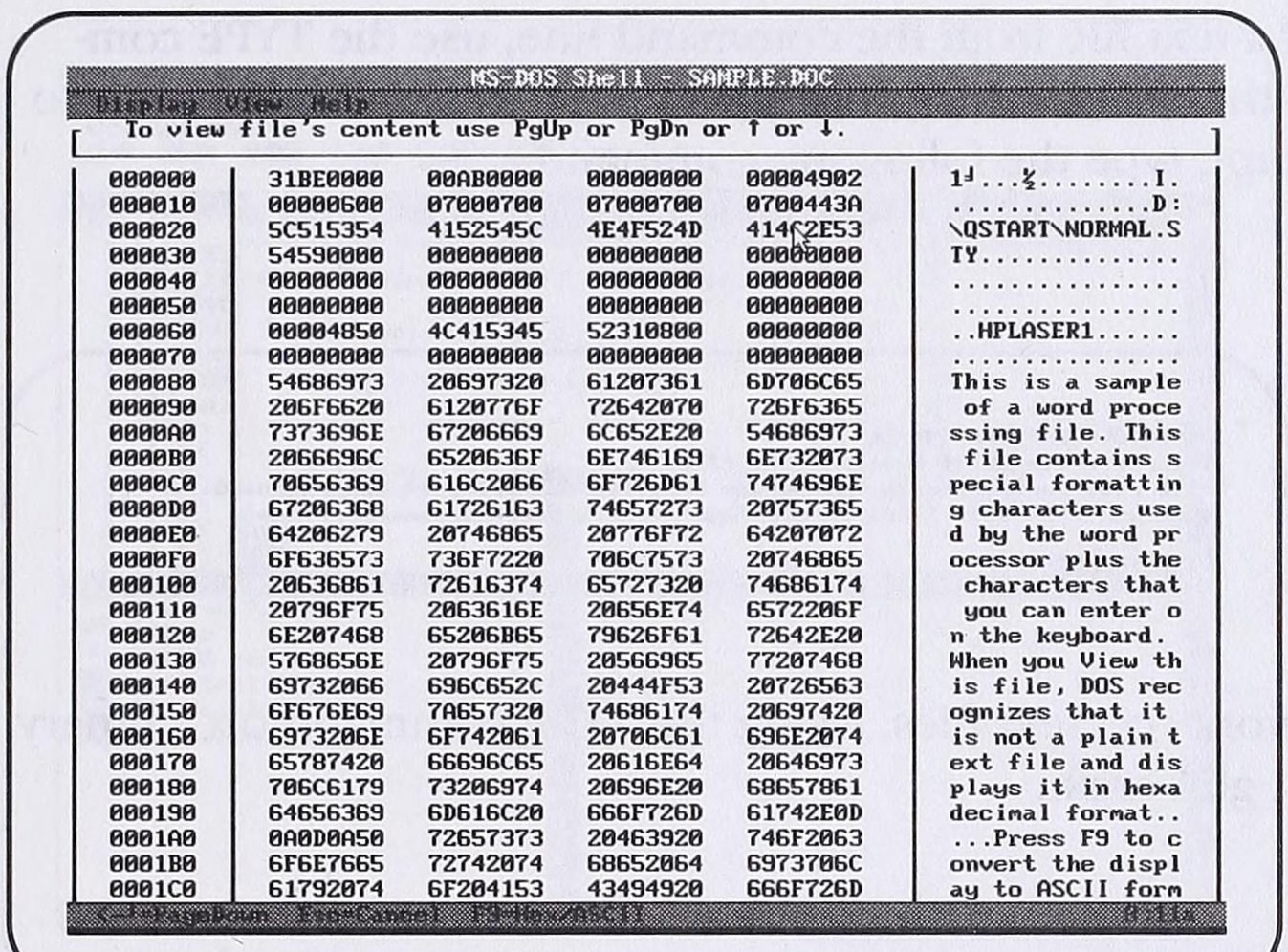

MS-DOS Shell - SAMPLE.TXT
Display View Help
To view file's content use PgUp or PgDn or ↑ or ↓.
This is a sample of a plain text file.
This file contains only characters that you can enter on the keyboard.
When you View this file, it displays in text format.

DOS displays the contents of the selected file. To clear the display and return to the DOS Shell, press Esc.

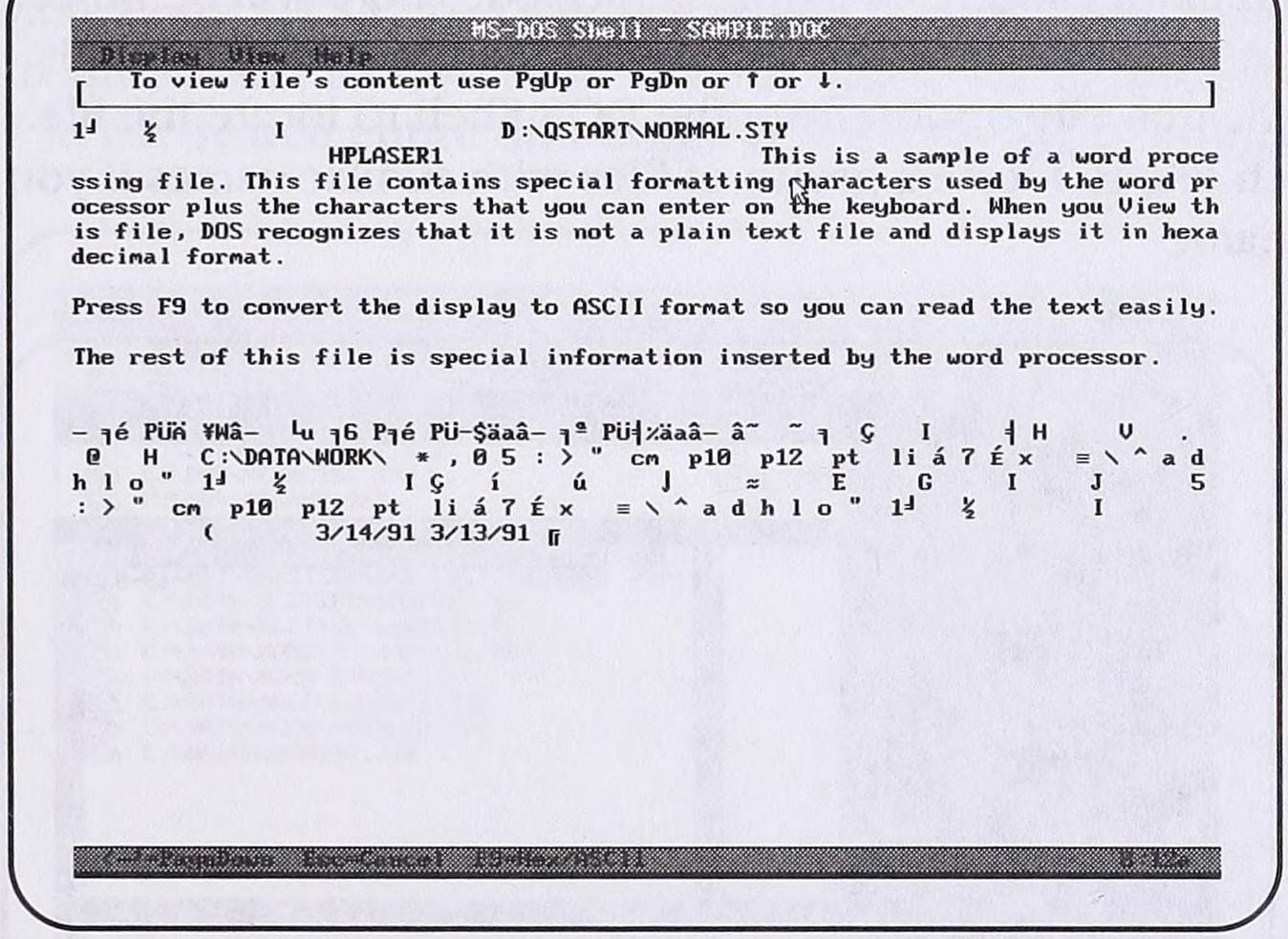
The SAMPLE.TXT file is an example of a text, or *ASCII,* file. ASCII files contain only text characters and a few control characters that you can enter on your keyboard, such as tabs and returns.

You also can view files that are not simple ASCII files. You may want to view a word processing file. A word processing file is mostly text, but it also contains special format and control information used by your word processing program.

When you view a file that is not a pure text file, DOS displays the file in *hexadecimal* format—a format the computer uses to store information internally. Because you just want to look at the text part, press F9 to convert the display to ASCII. Some of the display will be gibberish, but you can read the text.



When you view a file that is not a pure ASCII file, DOS displays the file in hexadecimal format with the ASCII display along the right side. Press F9 to convert the hexadecimal display to ASCII.


MS-DOS Shell - SAMPLE.DOC
Display View Help
To view file's content use PgUp or PgDn or ↑ or ↓.
1╛ ½ I D:\QSTART\NORMAL.STY
HPLASER1 This is a sample of a word proce
ssing file. This file contains special formatting characters used by the word pr
ocessor plus the characters that you can enter on the keyboard. When you View th
is file, DOS recognizes that it is not a plain text file and displays it in hexa
decimal format.
Press F9 to convert the display to ASCII format so you can read the text easily.
The rest of this file is special information inserted by the word processor.
- ┐é PüÄ ¥Wâ- └u ┐6 P┐é Pü-$äaâ- ┐ª Pü┤¾äaâ- â˜ ~ ┐ Ç I ┤ H V .
@ H C:\DATA\WORK\ * , 0 5 : > " cm p10 p12 pt li á 7 É x ≡ \ ^ a d
h l o " 1╛ ½ I Ç í ú ┘ ≈ E G I J 5
: > " cm p10 p12 pt li á 7 É x ≡ \ ^ a d h l o " 1╛ ½ I
(3/14/91 3/13/91 ╔

Because the display does not break lines between words, a word processing file is harder to read than a text file with a Return at the end of each line.

Some files, such as program files with .EXE or .COM file extensions and other binary files, contain very little text and display only gibberish when viewed.

11

To list the contents of a text file from the command line, use the TYPE command. First, switch to the disk and directory that contains the file you want to view. At the DOS prompt, type the following command:

TYPE filename

DOS displays the SAMPLE.TXT file.

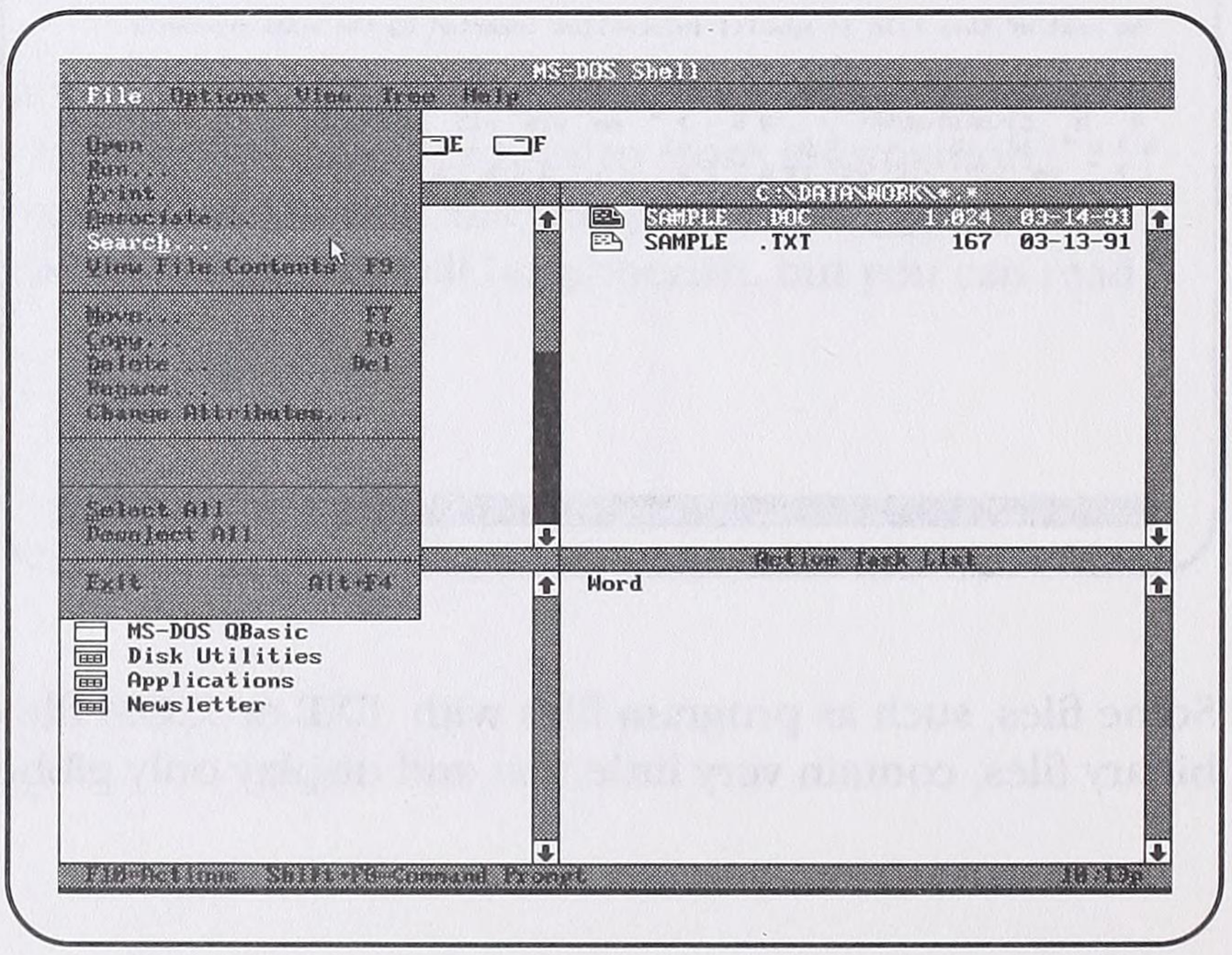
```
C:\DATA\WORK>TYPE SAMPLE.TXT
This is a sample of a plain text file.
This file contains only characters that you can enter on the keyboard.
When you View this file, it displays in text format.

C:\DATA\WORK>
```

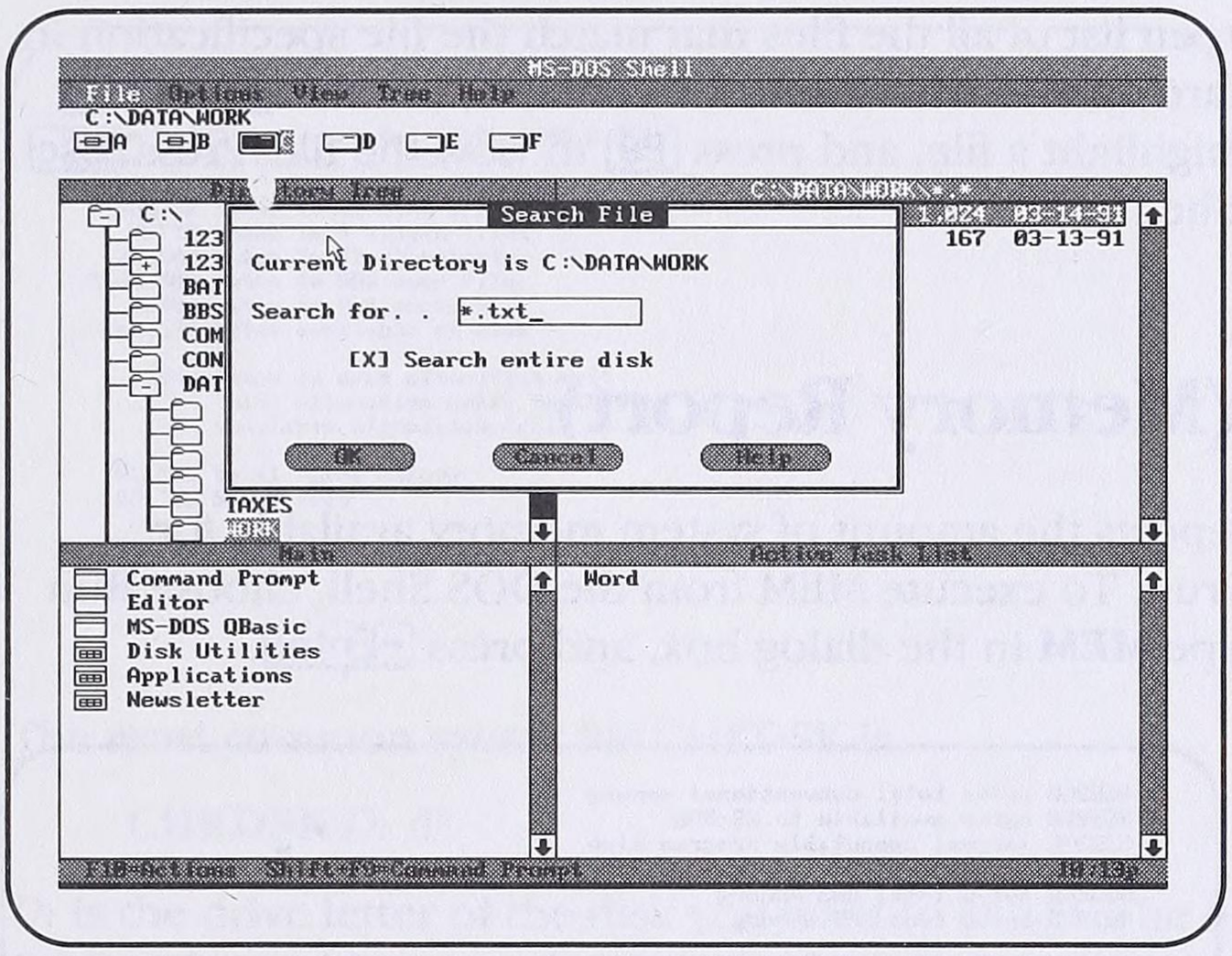
The TYPE command works on text files. Using the TYPE command on a binary file shows nothing but gibberish.

Locating a File

A hard disk usually contains hundreds of files. You begin by organizing these files so that you can remember where every file is located. There will be times, however, when you can't remember which subdirectory a file is in. When this happens, you can use Search File option from the DOS Shell to locate the file. You also can use Search File to locate a group of files with similar names if you are unsure of the file name.

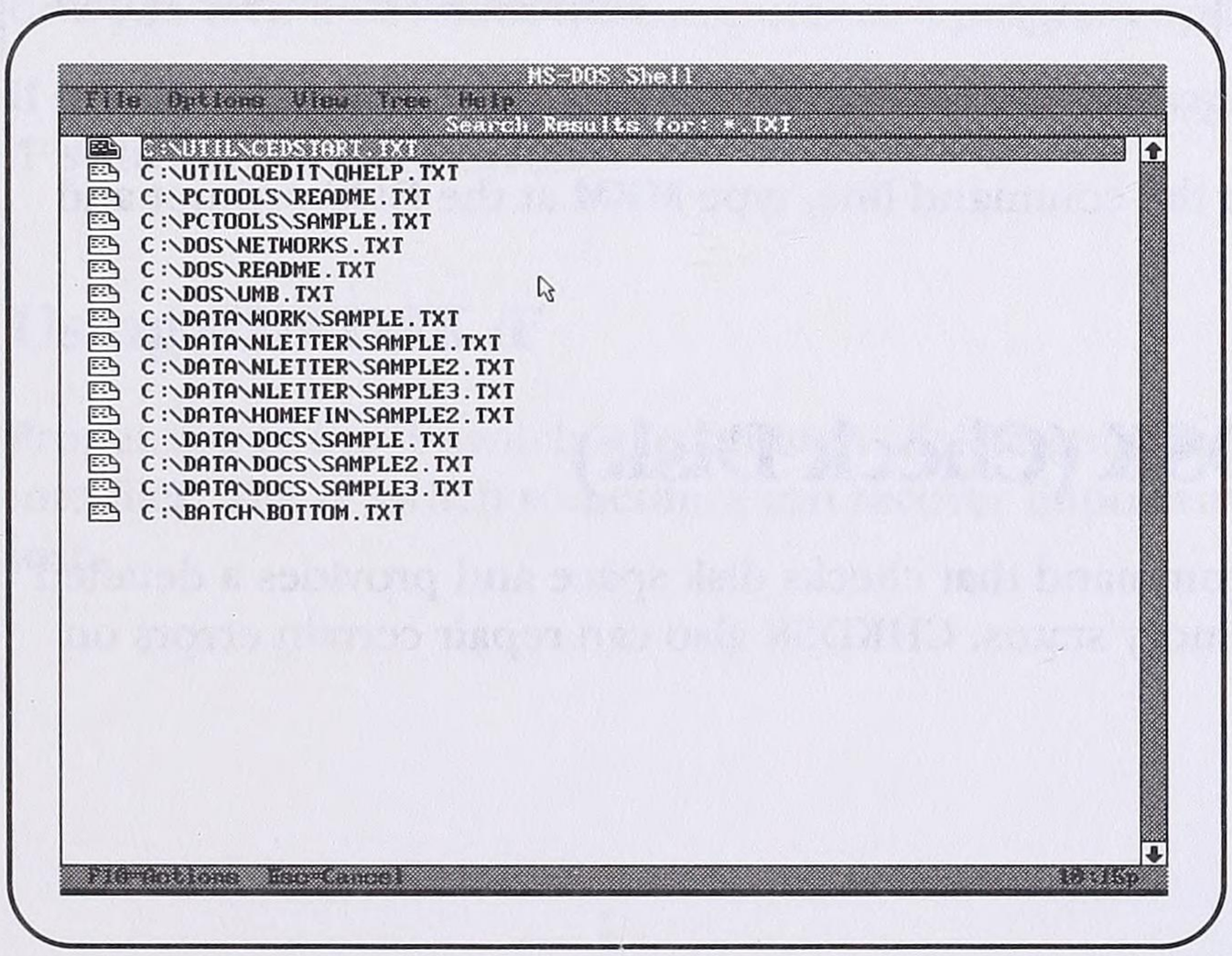
Make the Directory Tree or the File List area active. Then choose Search from the File menu to find the location of a file or group of files.





Type the name of the file you want to locate in the text box.

The default is *.*, which lists all files. To locate all files with a TXT file extension, enter ***.TXT**. You can search just the current directory or the entire disk. In almost all cases, you will want to search the entire disk, so leave the default X in the Search entire disk check box. Press ↵Enter to start the search.



A listing of all files on the disk with a TXT file extension is displayed.

DOS displays a full-screen list of all the files that match the file specification in the dialog box. If you are unsure what a text file contains, use the ↑ and ↓ keys or the mouse to highlight a file, and press F9 to view the file. Press Esc to return to the DOS Shell.

Using MEM (Memory Report)

The MEM command reports the amount of system memory available for programs to load and run. To execute MEM from the DOS Shell, choose **R**un from the File menu, type **MEM** in the dialog box, and press ↵Enter.

The MEM command tells you about the types of memory available on your computer and the size of the largest program that you can execute.

```
  655360 bytes total conventional memory
  655360 bytes available to MS-DOS
  535392 largest executable program size

  983040 bytes total EMS memory
  491520 bytes free EMS memory

 2490368 bytes total contiguous extended memory
  983040 bytes available contiguous extended memory
       0 bytes available XMS memory
         MS-DOS resident in High Memory Area

Press any key to return to MS-DOS Shell
```

To execute MEM from the command line, type **MEM** at the DOS prompt and press ↵Enter.

Using CHKDSK (Check Disk)

CHKDSK is the DOS command that checks disk space and provides a detailed report of disk and memory status. CHKDSK also can repair certain errors on the disk.

```
C:\DATA>chkdsk

Volume DRIVE_C     created 10-03-1990 3:45p
Volume Serial Number is 1650-7DB2

  27553792 bytes total disk space
     75776 bytes in 3 hidden files
    108544 bytes in 47 directories
  23654400 bytes in 989 user files
     20480 bytes in bad sectors
   3694592 bytes available on disk

      2048 bytes in each allocation unit
     13454 total allocation units on disk
      1804 available allocation units on disk

    655360 total bytes memory
    291152 bytes free

C:\DATA>
```

CHKDSK displays a status report of the disk and available memory.

The most common syntax for CHKDSK is

CHKDSK *D:* /F

D: is the drive letter of the disk you want to check. The optional /F switch tells DOS to fix problems on the disk if it finds errors. If you omit the name of the disk, the command uses the current disk.

Before CHKDSK displays its status report, it checks every file on the disk and makes sure that the information in the File Allocation Table agrees with the information in the disk directory. Any errors represent *lost clusters*, or files that have been lost. You may lose files if a program freezes as it updates a file, or if you turn off or boot the computer as a program updates a file.

If it finds any errors, CHKDSK displays a warning message. You must use the /F switch to fix these errors.

Using CHKDSK /F

Proper use of the /F switch is a common "fix" to convert lost clusters on disks into files. The /F switch sometimes can recover important data you may have lost.

11

The /F switch causes DOS to ask you whether to proceed before it fixes problems the command has detected.

```
C:\>CHKDSK /F

Volume BILLS ACER  created 07-24-1990 8:10p
Volume Serial Number is 3E40-1BCF

   138 lost allocation units found in 2 chains.
Convert lost chains to files (Y/N)?Y

  97728512 bytes total disk space
    120832 bytes in 7 hidden files
    143360 bytes in 55 directories
  53618688 bytes in 2116 user files
    282624 bytes in 2 recovered files
  43563008 bytes available on disk

      2048 bytes in each allocation unit
     47719 total allocation units on disk
     21271 available allocation units on disk

    655360 total bytes memory
    389888 bytes free

C:\>
```

CHKDSK assigns these files names as shown on-screen. Files no longer useful can be deleted safely.

CHKDSK converts clusters into files with the name FILE*nnnn*, where FILE*nnnn* stands for FILE0001, FILE0002, FILE0003, and so on.

```
C:\>DIR *.CHK

 Volume in drive C is BILLS ACER
 Volume Serial Number is 3E40-1BCF
 Directory of  C:\

FILE0000 CHK      4096 09-12-90  12:06p
FILE0001 CHK    278528 09-12-90  12:06p
        2 File(s)   43563008 bytes free

C:\>
```

Avoid using /F until you know the implications of the fix action. *Que's MS-DOS 5 User's Guide*, Special Edition explains the /F switch actions in detail.

Do not run CHKDSK /F from the DOS Shell or when any other program is running. CHKDSK may consider a file in use by the other program to be a lost cluster and you could lose part of a good file.

Using CHKDSK before a Backup

One useful feature of CHKDSK is its capability to report the number of bytes used in directories, user files, and hidden files. You can use CHKDSK before you issue the BACKUP command to determine the number of bytes to be backed up. You can then determine the number of floppy disks you need for the backup.

Space on floppy disks usually is measured in kilobytes or megabytes. Divide the total number of bytes to be backed up by 1,000 for kilobytes, or by 1,000,000 for megabytes. Divide the number of kilobytes or megabytes by the capacity of your backup floppies to find out how many disks you will need to complete the backup.

Suppose, for example, that you want to back up your hard disk drive C, but don't know how many floppies you need. You can issue the **CHKDSK C:** command.

The report gives you the disk's total capacity in bytes, the number of hidden files and their byte total, the number of directories and their byte total, and the number of user files and their byte total. The report also gives the total memory bytes in RAM and the number of RAM bytes free for use.

If you add the number of bytes in directories and user files, you have the number of bytes to be backed up. Normally the directory files do not add up to much more than 100K. You will be safe using the user files total to calculate the number of floppies you need for a backup.

Remember, the number of disks required is based on their capacity to hold a specific amount of data. A 1.2M floppy holds four times the data of a 360K disk. Verify that your disks have the capacity you expect. Double-check disk labels for the correct density and watch for bad sectors when formatting floppy disks.

Understanding CHKDSK and Fragmentation

As you add and delete files on a disk, the free space for new files becomes spread around the surface of the disk.

11

When you create or change a file and your application program or a DOS command writes a file to disk, DOS allocates data storage space by finding the next available disk space. If the first available space is too small to hold the entire file, DOS fills that space and puts the rest of the file into the next available space(s).

This phenomenon is called *fragmentation*. Even technological marvels can be sloppy housekeepers; fragmented files lower disk performance.

A form of the CHKDSK command that checks for fragmentation is

CHKDSK *d:filespec*

D: is the drive letter of the disk you want to check. *Filespec* is the file specification for the file or files that you want to check for fragmentation. When a file is fragmented, CHKDSK reports the number of *noncontiguous* blocks used to contain the file. Each block is a separate area of the disk used to hold part of the file.

CHKDSK reports whether a file is fragmented—not stored in a contiguous block. In this example, all the files in the current directory are checked and CHECKS.WK1 is fragmented.

```
C:\DATA\TAXES>CHKDSK *.*

Volume DRIVE_C     created 10-03-1990 3:45p
Volume Serial Number is 1650-7DB2

  27553792 bytes total disk space
     75776 bytes in 3 hidden files
    108544 bytes in 47 directories
  23652352 bytes in 991 user files
     20480 bytes in bad sectors
   3696640 bytes available on disk

      2048 bytes in each allocation unit
     13454 total allocation units on disk
      1805 available allocation units on disk

    655360 total bytes memory
    324880 bytes free

C:\DATA\TAXES\CHECKS.WK1 Contains 7 non-contiguous blocks

C:\DATA\TAXES>
```

Fragmentation is not serious. It happens to all active disks. But fragmentation does slow down disk operations. There are two ways to *defragment* a disk. The most common and the fastest is to buy a DOS utility package, such as PC Tools Deluxe, Mace Utilities, Norton Utilities, or many others that contain disk defragmentation programs.

Another way to defragment a disk is to back up all the files to another disk, delete the files from the hard disk, and then restore the files to the hard disk. The BACKUP and RESTORE commands are covered in Chapter 10.

Using CLS (Clear Screen)

The CLS command erases or clears the display and positions the cursor at the top of the screen, after the DOS prompt. Use CLS when the screen becomes too "busy" with the contents of previous commands' output. CLS has no parameters. You simply enter **CLS** at the DOS prompt, and the screen clears.

The main use for CLS is with batch files, which are covered in Chapter 12.

Using VER (DOS Version)

You may find it useful to know the exact version of DOS your computer is using.

```
C:\>ver

MS-DOS Version 5.00 RC 3a

C:\>
```

VER reports a manufacturer's name and the version number of DOS. Your particular VER report may look slightly different.

VER is useful if you must work on another person's computer. You can issue this command before you start work to see which DOS version the computer is using. In this way, you know which commands or switches the computer accepts.

VER also is useful when you boot your system from a disk you did not prepare. The floppy may contain system files from a version of DOS you normally do not use. The VER command has no parameters and is issued at the DOS prompt.

Using VERIFY (File-Writing Verification)

VERIFY checks the accuracy of data written to disks. VERIFY has one parameter, which is ON or OFF. When you type **VERIFY ON** at the prompt, DOS rereads all data to ensure that it was written correctly. When VERIFY is set to ON, DOS operations are slower; therefore, you might want to use the command with only important data. Type **VERIFY OFF** to turn verification off.

11

To display the status of VERIFY, type **VERIFY** and press ↵Enter.

```
C:\>verify
VERIFY is on

C:\>
```

Using VOL (Display Volume Name)

When you format a disk, you can enter a disk volume label for the disk.

When you type **VOL** at the DOS prompt, DOS displays the volume name of the current disk if you entered a name when you formatted the disk.

```
C:\>VOL

 Volume in drive C is DRIVE_C
 Volume Serial Number is 1650-7DB2

C:\>VOL B:

 Volume in drive B has no label
 Volume Serial Number is 1935-13E7

C:\>
```

The VOL command also displays the volume serial number automatically assigned by DOS when you formatted the disk. If you add a drive letter after the command, DOS displays volume information for that drive.

Viewing volume names is much easier than wading through directory listings when you sort through floppy disks.

Using LABEL (Change a Volume Name)

After you format a disk, you can add or change the volume label with the LABEL command. You should change a disk's volume label when you change the use for the disk. When you first formatted the disk, you might have labelled it *TAX91*, for example. Later, you want to use the disk to keep a backup copy of your 1992 business files, so you change the label to *BUSINESS92*.

The syntax is for this command is as follows:

LABEL *d: label*

where *d:* is the drive letter and *label* is the new label. If you omit the drive letter, DOS uses the current drive. If you omit the label, DOS prompts you to enter the label or press ↵Enter for no label.

```
C:\>LABEL B:
Volume in drive B is TAX91
Volume Serial Number is 1935-13E7
Volume label (11 characters, ENTER for none)? BUSINESS92

C:\>
```

If you do not specify a label, DOS displays the current volume information and prompts you for a label. Just press ↵Enter at the prompt to remove an existing label.

You can use Quick Format to change the volume label and erase all files and subdirectories on a disk with one command. You learned about Quick Format in Chapter 6.

Lessons Learned

- You are likely to use only a fraction of DOS's commands.
- You can view file contents easily from the DOS Shell.
- If you misplace a file, you can use SEARCH FILE to locate it.
- Such DOS commands as MEM, VER, CHKDSK, VOL, and LABEL are quick commands for controlling and monitoring your hardware and software.
- When you copy critical files, you can use VERIFY to double-check that the file was copied successfully.

Next, you learn to customize and add some personality to your PC with batch, CONFIG.SYS, and AUTOEXEC.BAT files.

11

12

Customizing DOS

Up to now everything you have done with your personal computer has been based on how DOS does things, especially at the command line. In this chapter you take control. You learn how to construct your own commands so that DOS works the way you want.

In this chapter, you learn how to customize your DOS environment to meet your specific needs. You can make working with your computer lively or dull, somber or splashy. Your most useful tool is the batch file.

This chapter is not designed to make you a batch file expert, although you may be surprised to find how much you can learn in a few pages.

If you have read this far, you are a reasonably skilled DOS user. The following sections teach you how to create and modify batch, AUTOEXEC.BAT, and CONFIG.SYS files. Also included here are some useful sample batch files.

Creating a batch file

Understanding the AUTOEXEC.BAT file

Creating a AUTOEXEC.BAT file

Understanding the CONFIG.SYS file

Creating a CONFIG.SYS file

Creating sample batch files

12

Key Terms Used in This Chapter

PATH command	The command that instructs DOS to search through a specified set of directories for programs or batch files. If you try to execute a program or batch file that is not in the current directory, DOS searches through the directories in the search path. If the program or batch file is found in one of the directories in the search path, DOS executes it.
Batch file	A text file that contains DOS commands, which DOS executes as though the commands were entered at the DOS prompt. Batch files always have a .BAT extension.
Meta-string	A series of characters that takes on a different meaning to DOS than the literal meaning. DOS displays substitute text when it finds meta-strings in the PROMPT command.
AUTOEXEC.BAT file	A batch file that executes automatically each time you boot your computer. AUTOEXEC.BAT is an ideal place to include commands that initialize and personalize the control of a PC.
CONFIG.SYS file	A file whose contents are used by DOS to tailor hardware devices and to assign the computer's resources.
Buffer	An area of RAM allocated by DOS as a temporary storage area for data that is moving between the disks and an executing program.

The PATH Command

You have seen the effects of using the PATH command throughout this book without knowing it. When you installed DOS, part of the automated installation procedure either added a PATH command to your AUTOEXEC.BAT file or made sure that the C:\DOS directory was included in the PATH.

Using the PATH command is one of the most important techniques you can employ to make your computer a little easier to use. So far, PATH has been kept under wraps. Now you will learn its power.

When you tell DOS to execute an internal command that is built into COMMAND.COM (such as DIR), DOS has that command in memory and ready to execute. When you execute an external command (such as FORMAT), DOS must find the FORMAT program on your disk. First DOS looks in the current directory. If it cannot find the program, it then looks in the directories specified in the PATH command.

When the DOS installation set up a PATH command that included C:\DOS, it made sure you could use FORMAT and all the other external DOS commands no matter what the current directory is. You can add other directories to the PATH command so that you can execute batch files and other programs from any disk or directory on your computer.

Actually, DOS can find programs and batch files in these three situations:

- The file is in the directory in which you are working (the current directory). This is the case when you execute Lotus 1-2-3 from the directory that contains the 1-2-3 program files, such as **123R22**, as explained in Chapter 8.
- The file is not in the current directory, but you include the full path on the command line. An example of this situation was when you included the path to the Microsoft Word directory in the Program Properties Commands box for Word in Chapter 8. The command to execute Microsoft Word was **C:\WORD\WORD.**
- The directory in which the file is located is on the *search path* established by the PATH command. This situation is the case when you execute external DOS commands and, as you will see, when you execute batch files.

The search path is the list of directories specified in the PATH command. This PATH command instructs DOS to search each directory shown

```
PATH=C:\DOS;C:\BATCH;C:\UTIL
```

If no path is specified, and the program or batch file is not found in the current directory, DOS first looks for the file in the C:\DOS directory. If the file is still not found, DOS then checks the C:\BATCH directory, then the C:\UTIL directory.

If you include more than one directory in the PATH command, you must separate the directories with a semicolon (;) character. To issue the PATH command at the DOS prompt, type the following:

PATH *d:path specifier;d:path specifier...*

The drive specifier *d:* names the drive on which DOS is to search. The first *path specifier* is the first directory on the search path. The semicolon (;) separates the first directory from the optional second directory. The ellipses shows that you can have other path specifiers in your command line.

It takes some time for DOS to search the directories in a search path for a program or batch file. DOS searches the directories in the order listed in the PATH command. You should list the directories in the order of most use, therefore. If you mostly use DOS commands, place the C:\DOS directory first in the path. As you become more experienced with batch files, you may find that you use batch files more than DOS commands. In this case, place the C:\BATCH directory first in the path.

DOS retains the PATH until you change the command or reboot the computer. Because you must specify a search path every time you boot your computer, the PATH command is found in the AUTOEXEC.BAT file of every computer with a hard disk.

The PROMPT Command

The DOS prompt is another visible part of your computer system that you can customize. In fact, if you have a hard disk, you almost have to customize the DOS prompt.

The default prompt displays the current drive followed by the greater-than sign:

```
A>
```

This prompt is useful if you have only floppy disks. If you have a hard disk, however, the default prompt is inadequate. You want the prompt to show the

current disk and the current directory. If you have a hard disk, the standard prompt, used by almost everyone, is the current path and the greater-than sign:

```
C:\DOS>
```

This prompt has been the standard throughout the book. Now you will learn how to use the PROMPT command to customize the prompt. The symbolic syntax for the PROMPT command is

PROMPT *text*

The *text* is any combination of words or special characters. The term used to describe the special characters is *meta-string*.

Understanding Meta-Strings

A meta-string consists of two characters—the first is the dollar sign ($) and the second a keyboard character. DOS interprets meta-strings to mean something other than the literal character definition. For instance, the meta-string $t in the PROMPT command tells DOS, "Display the current time, in the HH:MM:SS.XX format," in the DOS prompt. $t displays the current system time as part or all of the command prompt.

DOS recognizes the symbols > and < and the vertical bar (|) as special characters. These characters have meta-string equivalents, which enable you to use them in PROMPT text. You must substitute an appropriate meta-string to cause these special characters to appear in the prompt. Otherwise, DOS tries to act on the characters in its usual way. Table 12.1 summarizes meta-string characters and their meanings to the PROMPT command.

Table 12.1
Meta-String Characters

Character	*What it produces*
$	$, the actual dollar sign.
_ (underscore)	Moves the cursor to the next line.
b	The vertical bar |.
d	The current date.
g	The > character.

continues

Table 12.1 *(continued)*

Character	*What it produces*
l	The < character.
n	The current disk drive letter.
p	The current drive and path.
q	The = character.
t	The system time.
v	The DOS version.
Any other character	The character is ignored.

Customizing Your Prompt

The standard prompt is

```
PROMPT $p$g
```

The $p displays the current path, including the drive. The $g displays the greater-than sign.

You can use the meta-string characters with the PROMPT command to produce your own DOS prompt. PROMPT permits words or phrases in addition to meta-strings. You can experiment with different combinations of meta-strings and phrases.

When you find a combination that you favor, type the PROMPT command and the meta-string and phrase in your AUTOEXEC.BAT file. Then, each time you boot your computer, your custom prompt appears. Issuing the PROMPT command alone with no parameters restores the prompt to its default, the drive name and the greater-than sign (C>).

Suppose that you want your prompt to tell you the current DOS path, type this command:

```
PROMPT THE CURRENT PATH IS $p
```

When your current location is on drive C in the DOS directory, this PROMPT command produces the following prompt:

```
THE CURRENT PATH IS C:\DOS
```

By adding the > character (using the meta-string $G), the command would be

```
PROMPT THE CURRENT PATH IS $p$g
```

Now your DOS prompt would appear as

```
THE CURRENT PATH IS C:\DOS>
```

Defining the Batch File

A *batch file* is a text file that contains DOS statements. These statements execute DOS commands, execute programs, change the computer environment, or even provide special processing that is possible only in a batch file. DOS executes these statements one line at a time, treating them as though you had entered each statement individually.

Batch files always have the extension .BAT in their full file names. When you type a batch file's name at the DOS prompt, COMMAND.COM searches in the current directory, then through the search path, for either a program or a batch file with that file name. COMMAND.COM then reads the batch file and executes the statements that the file contains. The whole process is automatic. You enter the batch file name, and DOS does the work.

You can name a batch file anything you want as long as it has a .BAT extension. When you type a name at the DOS prompt, however, DOS first looks for that name as an internal command built into COMMAND.COM. If you name a batch file COPY.BAT, for example, you can never execute the batch file because DOS will execute the COPY command instead.

If DOS does not find the name in its list of internal commands, it looks for a program file with a .COM or .EXE file extension before it looks for a file with a .BAT extension. For this reason, never use a batch file name that is the same as a DOS command name. If the \DOS directory is before the \BATCH directory in the PATH command, the DOS command executes. If the \BATCH directory is first, the batch file executes. You can avoid this conflict and confusion by using unique names.

Nobody says batch files can accomplish everything, because they can't. But batch files can make it easier and more pleasant to use your computer.

The batch file varies from being the most ignored to being the most abused of all programs. Many books are devoted to the batch file's capabilities, some to a point where readers walk away scratching their heads in confusion. In truth, you can consider the batch file to be the nonprogrammers' programming language. It is a limited yet powerful language: each word can have the power of several lines of DOS commands with the power of programming code.

In the Shell, you can review the contents of a batch file by simply highlighting the file and pressing F9, or choosing View File Contents from the File menu. At the command line, you can review the contents of a batch file by simply typing the **TYPE** command. In seconds, you can alter a file that changes your PC's personality.

If you use the command line, you will find the most uses for batch files. Batch files are less useful when you use the Shell. In fact, a number of techniques enable you to eliminate the need for many batch files by putting the information in the Program Properties Commands box when you create program groups. Even if you use the Shell most of the time, however, you will find batch files useful.

If you use the command line, batch files are useful for issuing multiple commands that are complex, potentially destructive, or easy to mistype at the command line. A good example is some form of the BACKUP command with several switches.

BACKUP is a simple command, but it can be confusing because you probably don't use it often. You may find it more convenient to put properly formed backup commands in batch files that you can execute with one simple batch name. This chapter contains a batch file for a full system backup that you can use as presented or change to fit your own situation.

Because batch files can display text that you enter, you can compose screens that enable you to execute commands, along with syntax examples, reminders, and explanatory notes about the commands. Also, you can simply display a message of the day.

In their advanced form, batch files resemble programs. This chapter teaches you the basic forms of batch files. If advanced techniques in batch processing interest you, be sure to read about batch files in *Que's MS-DOS 5 User's Guide*, Special Edition.

Creating a Batch File

Batch files contain ASCII text characters. Many word processing programs enable you to save a file as unformatted text. Word processors save documents in a special format with special codes for margins; indents; formats such as boldface, type style, and size; and other information. Most programs, however, give you the option of saving the file without these special codes. The word processor may call this unformatted, text, or ASCII format. If you save a formatted file as a batch file, the results may be unpredictable.

DOS now contains a handy, easy to use, full-screen text editor called EDIT. If you have heard about the DOS line editor, EDLIN, from prior versions of DOS, forget that EDLIN ever existed. EDLIN was not only difficult to use, but it also only allowed you to change one line at a time.

An easy way to create a very short and simple batch file from the command line is to use the COPY CON command. Just remember that COPY CON does not permit you to correct a text line after you press the Enter key.

Storing Batch Files

The best place to store batch files is in a directory named BATCH. Do not put your batch files in the root directory or the DOS directory.

In a way, the root directory is the most important directory on your hard disk because it contains the files needed to boot your computer, and it contains the first level of subdirectories, such as \DOS and your applications directories. When you view the files in the root, you do not want the file list to be complicated by any other files.

Do not put the batch files in the DOS directory because this directory should contain only files that are a part of DOS. When you upgrade to another version of DOS, you do not want to sort through a single directory that contains DOS files and other files to determine the files you want to keep and those you want to upgrade.

To create a \BATCH directory in the Shell, follow these steps:

1. Make the root directory current.
2. From the File menu, choose Create Directory.
3. Name the directory **BATCH**.

To create a \BATCH directory at the command line, simply type **MD \BATCH**.

Creating a Batch File with COPY CON

You are familiar with the COPY command. CON is a *reserved device name* in DOS. CON stands for CONSOLE and refers to the keyboard or the screen. To copy a file from CON means to copy from whatever you type at the keyboard. To copy a file to CON means to display it on the screen.

Using COPY CON, you can create a batch file that clears the screen and presents a wide directory. This batch file automates the CLS screen clear

command and the DIR command with the /W (wide display) switch. Follow these steps:

1. Make the \BATCH directory current.
2. Type **COPY CON WDIR.BAT** and press Enter.

   The cursor drops to the next line, and DOS waits for your keyboard input.

   Make sure that you type each line correctly. Use the Backspace key to correct mistakes and then press Enter. If you do make a mistake and press Enter, press Ctrl-C and resume the process from this step.
3. Type **CLS** and press Enter.
4. Type **DIR /W** and press Enter.
5. Press Ctrl-Z (hold down the Ctrl key and press Z) or press the F6 function key.
6. Press Enter.

DOS displays the message `1 File(s) copied.`

```
C:\>CD \BATCH

C:\BATCH>COPY CON WDIR.BAT
CLS
DIR /W
^Z
        1 file(s) copied

C:\BATCH>
```

To see that the directory contains the new batch file, type **DIR WDIR.BAT** and press Enter. To try out the batch file, type **WDIR** and press Enter. The screen clears, and the directory displays in its wide form. You have just created a new DOS batch file, using COPY CON. The WDIR batch file clears the screen then lists the files in the current directory in wide format.

At best, use COPY CON to create very short batch files. After you press Enter to complete a line, you cannot go back and change that line. Most of the time, you should use the DOS Editor to create and modify batch files.

```
C:\BATCH>DIR /W

 Volume in drive C is DRIVE_C
 Volume Serial Number is 1635-9ECA
 Directory of C:\BATCH

[.]             [..]            123.BAT         ADDPATH.BAT     AF.BAT
BLUE.BAT        PDOX.BAT        BNCOMM.BAT      BOTTOM.TXT      CEDB.BAT
CL.BAT          CLEAR.BAT       COMM.BAT        DATA.BAT        FB.BAT
FORM360.BAT     FORM720.BAT     HSG.BAT         HALOGRAB.BAT    INSET.BAT
INSETUP.BAT     MACE.BAT        ORGPATH.BAT     PC.BAT          PM.BAT
SETPATH.BAT     PU.BAT          R22.BAT         R22BUD.BAT      R22D.BAT
R22DB.BAT       R22H38.BAT      R22HOME.BAT     R22PMG.BAT      R22TAX.BAT
R3.BAT          REV.BAT         SQZ.BAT         START.BAT       SUB.BAT
TM.BAT          TM2.BAT         SETPATHW.BAT    SETPATHP.BAT    VP.BAT
WORD.BAT        WIN.BAT         WORKS.BAT       PDOX.PIF        Y
EDS.BAT         TSR.BAT         PX.BAT          PXPATH.BAT      HALO.BAT
STARTCL.BAT     SNAP.BAT        SAVE.BAT        BRIGHT.BAT      NORMAL.BAT
PROMPTN.BAT     R22A.BAT        WORDE.BAT       WDIR.BAT
       64 file(s)       3124 bytes
                     6025216 bytes free

C:\BATCH>
C:\BATCH>
```

The large number of batch files listed here is typical of a large hard disk that uses many different programs.

Creating a Batch File with the DOS Editor

The full-screen editor that comes with DOS 5 is very easy to use. The interface is much like the DOS Shell that you are used to using. The Editor looks and feels like a simplified version of Microsoft Works.

To start the Editor from the Shell, follow these steps:

1. Select the C:\BATCH directory.
2. Open the Main program group, if necessary.
3. Double click on **Editor** or select Editor and press ↵Enter.
4. Type the name of the file you want to create or change in the File to Edit dialog box and choose OK.

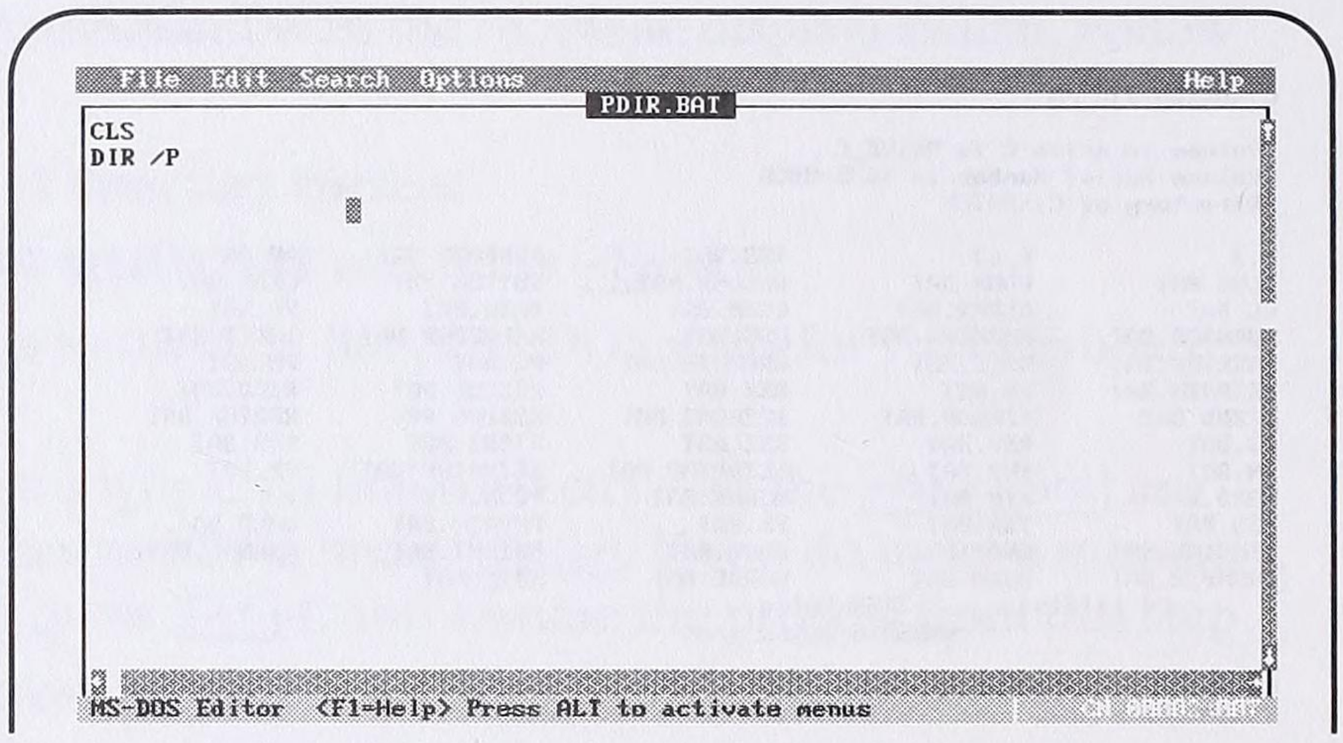
To start the Editor from the command line, follow these steps:

1. Make the C:\BATCH directory current.
2. Type **EDIT** and a space.
3. Type the name of the file you want to create or change and press ↵Enter.

Whether you start the Editor from the Shell or the command line, you do not have to include a data file name. If you include the name of an existing file, then that file is loaded into the Editor. If you do not include a data file name, the Editor starts with no data file. If you include the name of a new file that does not exist, the Editor starts with no file loaded but shows the name of the new file.

12

The DOS Editor is the best way to create and change batch files. This file, called PDIR.BAT clears the screen and lists the files in the current directory, pausing at each screenful.



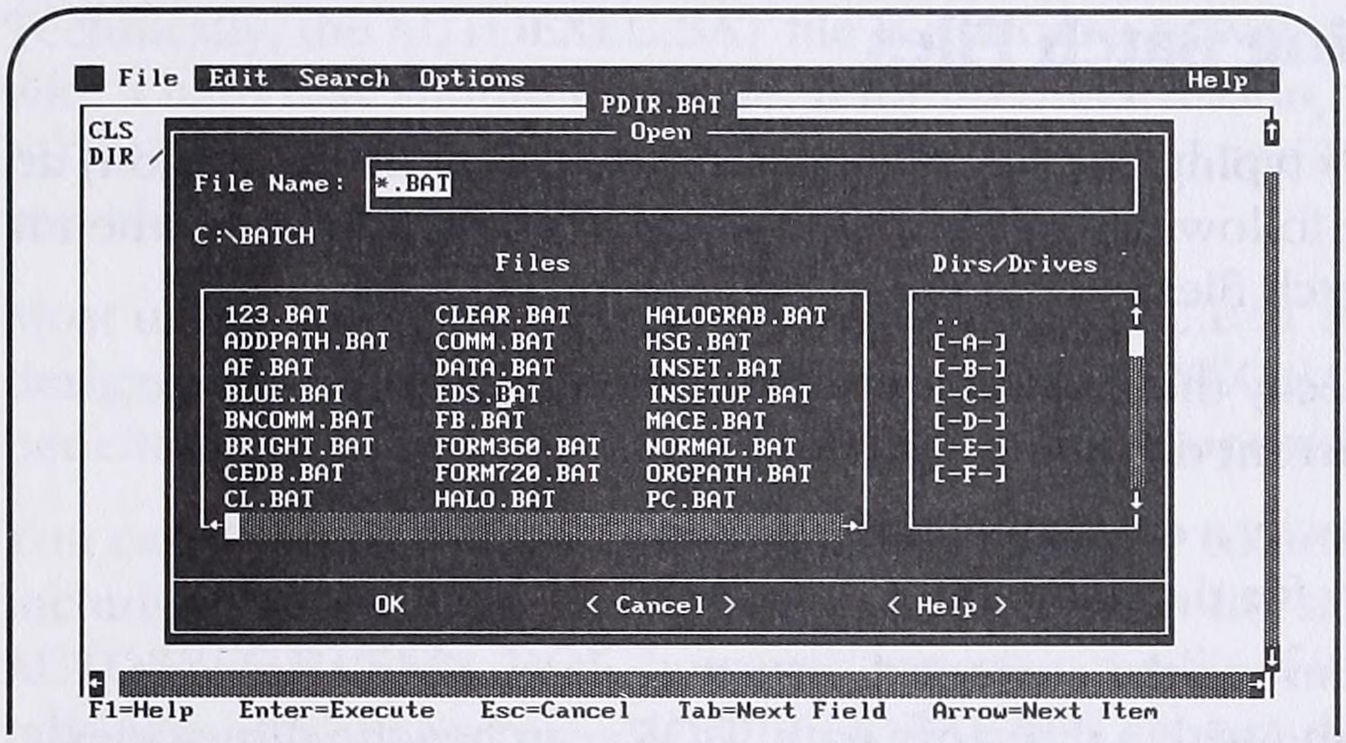
You type the batch file commands just as you type them at the DOS prompt. Press Enter at the end of each command. Use the arrow keys to move the cursor to make corrections.

The menus in the Editor work just like the menus in the Shell.

The File menu in the Editor contains most of the commands that you will use to create and change batch files. The included commands are as follows:

- The **N**ew option clears the current file from memory. The file name changes to `Untitled`. Use this command after you save the current file and want to create a new file from scratch.
- The **O**pen option reads a file into memory. Use this option after you save the current file and want to change another file.
- The **S**ave option saves the current file. Use this command after you change or create a file. If the file has never been saved and the file name is still `Untitled`, this command acts like Save **A**s.
- The Save **A**s option saves the file but first asks you to supply a file name. Use this command to save the file with a different name.
- The **P**rint option prints the file. Use this command to keep a printed copy of the file.
- The E**x**it option leaves the Editor.

When you choose **O**pen from the File menu, a dialog box is displayed. The default File name is always *.TXT.



To see the list of batch files in the current directory, type ***.BAT** in the File name box. Double-click on the file name you want to read, or select the file name and press ↵Enter.

If the file name you want is not visible, use the scroll bar below the files list. The scroll bar is similar to the scroll bars in the Shell, but it is horizontal rather than vertical.

Rules for Batch Files

When you create batch files, you must follow certain rules. The following list is a summary of those rules:

- Batch files must be ASCII text files. If you use a word processor, make sure that you save the file as a straight text or ASCII file.
- The name of the batch file can be from one to eight characters long. The name must conform to the rules for naming files. It is best to use alphabetical characters in batch file names.
- The file name must end with the extender dot (.), followed by the .BAT extension.
- The batch file name should not be the same as a program file name (a file with an .EXE or .COM extension).
- The batch file name should not be the same as an internal DOS command (such as COPY or DATE).
- The batch file can contain any DOS commands that you enter at the DOS prompt.
- You can include program names in the batch file that you usually type at the DOS prompt.
- Use only one command or program name per line in the batch file.

Rules for Running Batch Files

You start batch files by typing the batch file name (excluding the extension) at the DOS prompt. The following list summarizes the rules DOS follows when it loads and executes batch files:

- If you do not specify the disk drive name before the batch file name, DOS uses the current drive.
- If you do not specify a directory path, DOS searches through the current directory for the batch file.
- If the batch file isn't in the current directory and you didn't precede the batch file name with a directory path, DOS searches the directories in the search path.
- If a batch file is named the same name as a program and both are in the same directory, DOS executes the program, not the batch file. If the program and the batch file are in different directories, DOS executes the item it finds first in the search path.
- If DOS finds a syntax error in a batch file command line DOS displays an error message, skips the errant command, and then executes the remaining commands found in the batch file. Depending on the error, DOS may not pause at the error, but flash an error message too fast to read, and then continue. Do not assume that a batch file is correct because it seemed to end normally. Check to make sure that every command actually worked correctly.
- You can stop a batch command by pressing Ctrl-C or Ctrl-Break. DOS prompts you to confirm that you want to terminate the batch file. If you answer no, DOS skips the current command (the one being carried out) and resumes execution with the next command in the batch file.

If you try to run a batch file and DOS displays an error message, you probably made a mistake when you typed the name. You can view any batch file by using the TYPE *filename* command.

Understanding the AUTOEXEC.BAT File

One batch file has special significance to DOS. The full name of this batch file is *AUTOEXEC.BAT*. DOS automatically searches for this file in the root directory when you boot your computer. If an AUTOEXEC.BAT file is present, DOS executes the commands in the file.

Technically, the AUTOEXEC.BAT file is optional; however, every computer with a hard disk should have one. If for no other reason, you need an AUTOEXEC.BAT file so that you can specify a PATH and PROMPT every time you boot your computer.

Most users or system managers add an AUTOEXEC.BAT file of their own design on their boot disk. Using a custom AUTOEXEC.BAT file enables you to benefit from commands that automatically launch operating parameters.

You can omit AUTOEXEC.BAT, manually enter the commands you might include in an AUTOEXEC.BAT file, and accomplish the same result as an AUTOEXEC.BAT file. DOS, however, executes the file if it is there, so why not take advantage? As a rule, AUTOEXEC.BAT files are not distributed with the DOS package because different users need varied commands.

During the automated installation, DOS will create, verify, or change your AUTOEXEC.BAT file to include a PATH to the \DOS directory plus any other commands it needs to run on your computer. Some application programs come with installation programs that create or modify AUTOEXEC.BAT as an installation step of the package's main program.

If you have doubts about which commands to include in your AUTOEXEC.BAT file, the following sections may give you some ideas. You can include any commands you want in the AUTOEXEC.BAT file. Decide what you want the AUTOEXEC.BAT file to do, and follow certain rules. The following list is a summary of these rules:

- The full file name must be AUTOEXEC.BAT, and the file must reside in the root directory of the boot disk.
- The contents of the AUTOEXEC.BAT file must conform to the rules for creating any batch file.
- When DOS executes AUTOEXEC.BAT after a boot, you are not prompted for the date and time automatically. You must include the DATE and TIME commands in your AUTOEXEC.BAT file if your computer does not have a built-in clock with a battery backup (only the oldest PCs lack a clock).

Using AUTOEXEC.BAT is an excellent way for you to set up system defaults. That is, AUTOEXEC.BAT is the place to put commands you would want to enter every time you start your system. You can use AUTOEXEC.BAT, for example, to tell your computer to change to the directory that holds your most commonly used program and then to start it. Used this way, AUTOEXEC.BAT runs your program as soon as you boot your computer.

This screen is an example of an AUTOEXEC.BAT file—a batch file whose commands DOS executes each time you boot the computer.

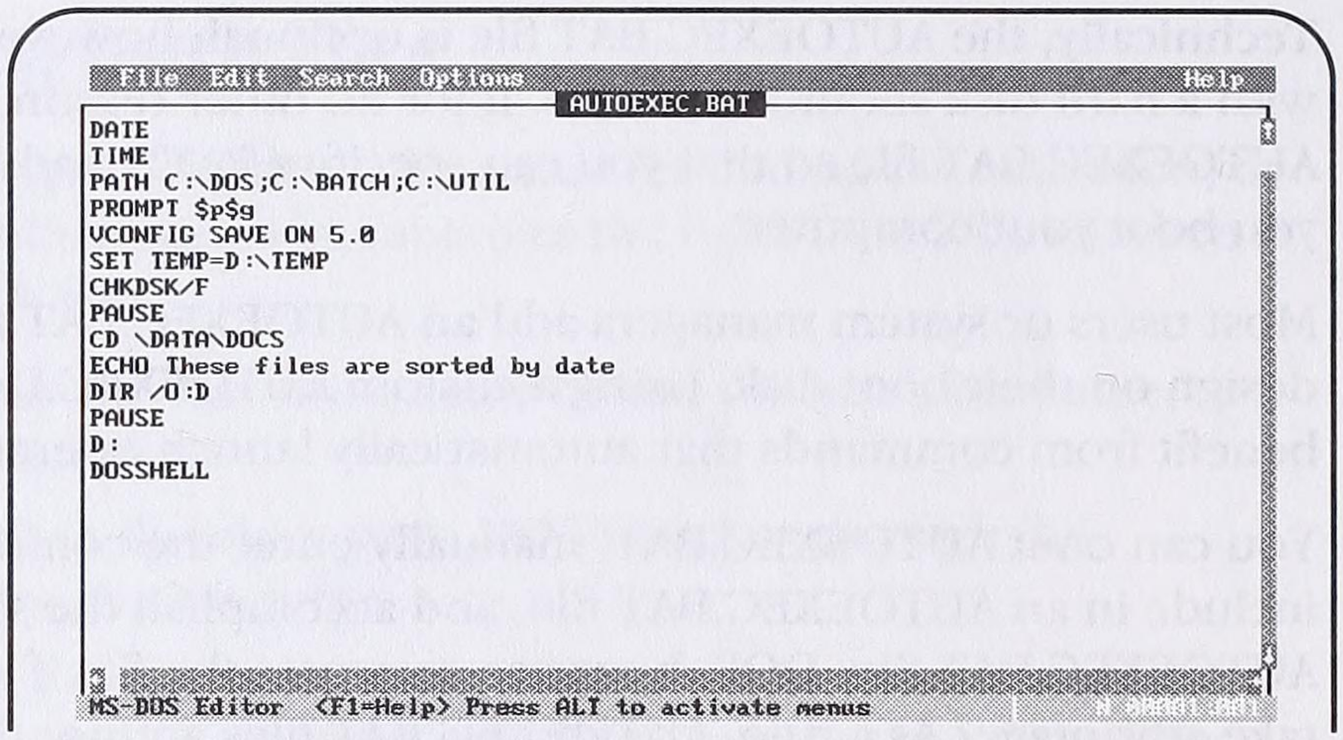


Table 12.2 lists the commands most frequently included in simple AUTOEXEC.BAT files plus a few other commands to give you an idea what you may add to your file. The table also explains each line of the batch file shown in the preceding figure.

Table 12.2
AUTOEXEC.BAT File Commands

Command	*Function in the AUTOEXEC.BAT File*
DATE	Sets the computer's clock to set up the correct date so that DOS can accurately "date stamp" new and modified files. Most computers have a built-in clock and do not need this command.
TIME	Sets the computer's clock to establish the correct time so that DOS can accurately "time stamp" new and modified files. The DATE and TIME commands also provide the actual date and time to programs that use the computer's internal clock. Most computers have a built-in clock and do not need this command.
PATH	Tells DOS to search the named subdirectories for files that have .EXE, .COM, or .BAT extensions.
PROMPT	Customizes the system prompt. The DOS prompt configuration can include information that makes navigating in directories easier. If you use the PROMPT command in the AUTOEXEC.BAT file, you don't need to enter the optional parameters each time you boot.

Command	*Function in the AUTOEXEC.BAT File*
VCONFIG	Turns on a "screen saver" that automatically blanks the screen after five minutes of inactivity. This is NOT a typical command found in an AUTOEXEC.BAT file. This is a program that comes with a certain brand of video adapter card. This command is included here to demonstrate that each AUTOEXEC.BAT file can contain special commands that fit each computer's environment. The more complicated your computer environment, the more of these special commands you are likely to have.
SET TEMP	Stores temporary files. DOS, Windows, and other programs need a place on the hard disk to store temporary files. If you do not have a SET TEMP command in your AUTOEXEC.BAT file, DOS adds it during installation.
CHKDSK/F	Verifies that there are no errors in the directory or file allocation table on your boot disk. Many people like to verify this each time they boot.
PAUSE	Pauses until you press a key so that you have a chance to see the result of the CHKDSK before the next command executes. Pause is used again after the DIR command for the same reason.
CD \DATA\DOCS	Changes the current path. If you have a data directory that you use most often, you may want to check it each time you boot.
ECHO	Allows you to include a message as part of your start-up when used in the AUTOEXEC.BAT file. On a floppy disk system, this message can remind you to insert a program disk in drive A.
DIR /O:D	Lists all the files in the \DATA\DOCS directory in date order.
D:	Changes to another disk drive.
DOSSHELL	Starts the Shell automatically when you boot.

Creating an AUTOEXEC.BAT File

The AUTOEXEC.BAT file is a privileged batch file because DOS executes its batch of commands each time you boot your computer. In every other sense, however, AUTOEXEC.BAT is like any other batch file. The best way to create and modify an AUTOEXEC.BAT file is with the DOS Editor.

Viewing the AUTOEXEC.BAT File

You can see whether AUTOEXEC.BAT exists in your root directory or on your logged floppy disk. If your hard disk is the logged drive, change to the root directory by typing

```
CD\
```

To look at the directory listing of all the files with .BAT extensions type

```
DIR *.BAT
```

To view the contents of AUTOEXEC.BAT type

```
TYPE AUTOEXEC.BAT
```

From the Shell, select the AUTOEXEC.BAT file and press F9 to view it. You also can view AUTOEXEC.BAT by reading it into the Editor. You can use the Editor to print a copy of the AUTOEXEC.BAT file as well.

If you choose not to print a copy of your AUTOEXEC.BAT file, make sure that you write down the contents before you make any changes. Copy the syntax correctly. This copy will serve as your worksheet. You can use your copy of AUTOEXEC.BAT to find out whether a PROMPT or PATH command is contained in the batch file. If you want to add or alter PROMPT or PATH commands, jot the additions or changes on your worksheet. Use your paper copy of the AUTOEXEC.BAT file to check for proper syntax in the lines you change or add before you commit the changes to disk.

Backing Up the Existing File

Always make a backup copy of your existing AUTOEXEC.BAT file before you make any changes to the file or install any programs. Remember that some program installation procedures automatically change your AUTOEXEC.BAT file. Save the current version by renaming it with a different extension.

Use the following procedure to make an archive copy of your AUTOEXEC.BAT for future use:

1. Make the root directory current.
2. Copy AUTOEXEC.BAT to another name, such as AUTOEXEC.ARC for archive. Do not use .BAK or .OLD as a file extension.

Now you can change your AUTOEXEC.BAT file, and if something goes wrong, you still have a copy of the original file. If the new file has an error, restore the original by copying AUTOEXEC.ARC to AUTOEXEC.BAT. You can use the Shell or the command line to make these copies.

Do not use .BAK as a file extension. Every time you save a file with some word processing programs, the program saves the old file with a .BAK extension. This action will write over your archive copy of AUTOEXEC.BAT. Do not use .OLD as a file extension because some automated installation procedures that change the AUTOEXEC.BAT file rename the existing file AUTOEXEC.OLD. This action will write over your archive copy of AUTOEXEC.BAT. As an extra precaution, keep an extra copy of your AUTOEXEC.BAT file on a floppy disk.

In fact, before you start making changes to the AUTOEXEC.BAT file, use FORMAT A:/S to make a bootable floppy disk. Keep this disk handy in case you cannot boot from your hard disk. You may make an error in your AUTOEXEC.BAT file that causes your computer to "hang," or freeze, as soon as you boot it. If you press Crtl-Break repeatedly, you may be able to stop the AUTOEXEC.BAT file execution. If this action does not work, boot off the floppy disk. Put the disk in drive A and boot your computer. Then switch to drive C and correct your AUTOEXEC.BAT file. Then take the disk out of drive A and try to boot off your hard disk again.

Modifying an AUTOEXEC.BAT File

After you make an archive copy of your AUTOEXEC.BAT file and create a separate boot floppy disk, you can safely modify the file. Follow these steps:

1. From the Shell, select AUTOEXEC.BAT and open the Editor. From the command line, change to the root directory and type **EDIT AUTOEXEC.BAT**.
2. Use the Editor to add, delete, and change commands.
3. Save the file, exit the Editor, and boot the computer to test the new file.

Keeping Several Versions of AUTOEXEC

Technically speaking, there is only one AUTOEXEC.BAT file. You can benefit from having several "versions" on hand, by giving different extensions to files named AUTOEXEC. You can then activate an alternative version by using the COPY command.

You can use in the extensions any character that DOS normally allows in file names. The extensions NEW, TMP, and 001 are just a few examples. By giving an AUTOEXEC file a unique name, such as AUTOEXEC.TMP, you can activate any other AUTOEXEC file by copying it to AUTOEXEC.BAT. To make AUTOEXEC.TMP your current AUTOEXEC file, for example, type

```
COPY AUTOEXEC.TMP AUTOEXEC.BAT
```

Then to restore your "normal" AUTOEXEC.BAT file, copy your archive copy to AUTOEXEC.BAT as follows:

```
COPY AUTOEXEC.ARC AUTOEXEC.BAT
```

This method is handy if you want to include commands for special activities, such as automatically starting a monthly spreadsheet. When the monthly work is done, and you no longer need the spreadsheet when you boot, you can reactivate your normal AUTOEXEC file.

Understanding the CONFIG.SYS File

AUTOEXEC.BAT is not the only file that DOS looks for when you boot your computer. Before DOS reads your AUTOEXEC.BAT file, in fact, before DOS even loads the command processor, it looks for the *CONFIG.SYS* file.

CONFIG.SYS is DOS's system configuration file. Not only does DOS provide built-in services for disks and other hardware, it also extends its services for add-on hardware. The additional instructions that DOS needs to incorporate such outside services as a mouse and other devices are included in the CONFIG.SYS file.

CONFIG.SYS is also the location for naming the values of DOS configuration items that can be "tuned." Files and buffers, discussed in the next section, are two "tunable" DOS items. CONFIG.SYS is a text file like AUTOEXEC.BAT that you can display on the screen or print. You can also change the contents of CONFIG.SYS with the DOS Editor.

DOS does not execute CONFIG.SYS as it does AUTOEXEC.BAT. Instead, DOS reads the values in the file and configures your computer to agree with those values. Many software packages modify or add a CONFIG.SYS file to the root directory. The range of possible values in the file is wide, but some common values that you can include do exist.

Specifying Files and Buffers

When DOS moves data to and from disks, it does so in the most efficient manner possible. For each file that DOS acts on, an area of system RAM helps DOS track the operating details of that file. The number of built-in RAM areas for this tracking operation is controlled by the FILES command in CONFIG.SYS. (A *command* establishes in the CONFIG.SYS file the value of a system setting that can be modified.) If a program tries to open more files than the FILES command setting allows, DOS will tell you too many files are open.

Do not be tempted to set your FILES command to a large number just so that you always have room for more open files. The system memory for programs is reduced by each extra file included in FILES. As a rule of thumb, a safe compromise is 30 open files. To set the number of open files to 30, type

```
FILES=30
```

The installation documentation for many programs tells you the minimum number of FILES the program needs. Make sure that the FILES command is at least as large as the largest number a program requires. If one program requires 20, and another suggests 30, for example, use FILES=30. Do not add the numbers together and type FILES=50.

Similar to the FILES command is the BUFFERS command. *Buffers* are holding areas in RAM that store information coming from or going to disk files. To make the disk operation more efficient, DOS stores disk information in file buffers in RAM. It then uses RAM, instead of the disk drives, for input and output whenever possible.

If the file information needed is not already in the buffer, new information is read into the buffer from the disk file. The information that DOS reads includes the needed information and as much additional file information as the buffer will hold. With this buffer of needed information, it is likely that DOS can avoid constant disk access. The principle is similar to the way a mechanic might use a small tool pouch. Holding frequently used tools in a small pouch relieves him of having to make repeated trips across the garage to get tools from his main tool chest.

Similar to the FILES command, however, setting the BUFFERS command too high takes needed RAM away from programs and dedicates it to the buffers. The optimum number of buffers depends on the size of your hard disk and type of application:

Hard Disk Size	*Number of Buffers*
Less than 40M	20
40M-79M	30
80M-119M	40
120M or more	50

Designating Device Drivers

You will recall that DOS works with peripherals, such as disk drives, printers, and displays. These peripherals are also called devices. DOS has built-in instructions, called *drivers*, to handle these devices.

Some devices, such as a mouse, are foreign to DOS. DOS lacks the built-in capability of handling them. To issue directions to devices that DOS doesn't recognize, use the DEVICE command. The syntax for this command is as follows:

DEVICE=*device driver file name*

The device driver for a mouse, for example, can be in a file called MOUSE.SYS. So that DOS understands how to use the mouse, you enter the following command:

```
DEVICE=C:\UTIL\MOUSE.SYS
```

The DEVICE command tells DOS to find and load the driver program for the new device. Then DOS can control the device. If the device driver is not in the root directory, include the path to the device driver. A good place to put device drivers is in the \UTIL directory.

Many peripherals come with a disk that contains a device-driver file. This file contains the necessary instructions to control, or drive, the device. The device-driver disk usually contains a provision to modify your CONFIG.SYS file to include the proper DEVICE command.

Some peripherals, especially nonstandard video adapters, come with diagnostic and other programs that you use to configure and control the peripheral.

These programs and device drivers are often kept in their own directories. The DEVICE command will then include the path to that directory so DOS can locate it.

Some device drivers also require additional parameters to work correctly on your computer. Always check your program and hardware manuals before experimenting with your system. Many installation programs provide prepared device drivers for you, but in some cases you have to enter the parameters yourself. A mouse driver may use COM1, for example, as the default serial port. If your mouse is attached to COM2, you may have to change the device driver as follows:

```
DEVICE=C:\UTIL\MOUSE.SYS /2
```

If you missed this item in the installation instructions for your mouse, note that your mouse will not operate.

Understanding Advanced DOS Configuration Options

A number of device drivers come with DOS. Some device drivers are added to your CONFIG.SYS file automatically during installation. These device drivers apply to the more advanced computers with a 286, 386, or 486 processor and *extended* memory. The normal memory that DOS and most programs typically use is called conventional memory and is limited to 640K. Extended memory is beyond the limit of conventional memory and can be used only in certain circumstances.

If you have a computer with a 386 or 486 processor and extended memory, you can configure your extended memory as expanded memory if it is needed by your applications programs. If you have a computer with extended memory, you can find more information in *Que's MS-DOS 5 User's Guide*, Special Edition.

If you have a computer with a 286 processor or higher, and you have extended memory, the DOS installation procedure adds the following commands to CONFIG.SYS:

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\SMARTDRV.SYS nnn
DOS=HIGH
```

HIMEM.SYS is the DOS extended memory manager, which allows DOS and applications programs to access extended memory.

SMARTDRV.SYS is a disk caching program that can speed up your disk operations, especially if you use database applications. A disk cache works a little like the BUFFERS command, but it is much "smarter" and can speed up disk accesses much more than the BUFFERS command. The ***nnn*** is the amount of extended memory in kilobytes that DOS reserves for the disk cache.

DOS=HIGH tells DOS to load part of itself into extended memory and save more conventional memory for application programs.

Although you do not have to understand the details of these commands, you should know where they came from if you see them in your CONFIG.SYS.

Creating and Changing a CONFIG.SYS File

Because the CONFIG.SYS file is a text file, you can use the same methods to create, change, archive, and copy this file as with the AUTOEXEC.BAT file. Use the Editor to create and change the CONFIG.SYS file. Make sure that you have a backup copy and an extra copy on a floppy disk before making changes. Note that errors in your CONFIG.SYS file cause your computer to hang more often than an error in the AUTOEXEC.BAT file. For this reason it is even more important to have a boot floppy disk handy before you start making changes to the CONFIG.SYS file.

A sample CONFIG.SYS file for a 386 computer with a 40M disk.

```
File  Edit  Search  Options                                    Help
                          CONFIG.SYS
FILES=30
BUFFERS=20
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\SMARTDRV 1024
DEVICE=C:\UTIL\MOUSE.SYS
DOS=HIGH

MS-DOS Editor  <F1=Help> Press ALT to activate menus
```

Your CONFIG.SYS file may contain other device drivers and DOS settings. Because the configuration of each computer may vary, the exact contents of the CONFIG.SYS file will vary. If you want to explore configurations and device concepts in more detail, consult *Que's MS-DOS 5 User's Guide,* Special Edition. If you are unsure about the device drivers for new peripherals you buy, ask your dealer how to incorporate the new device.

Creating Sample Batch Files

If you are a beginner, you may benefit from entering sample batch files. Practicing with the following examples will make it easier to understand how to construct your own DOS batch files.

Remember that to use handy batch files, the directory with your batch files should be in your search path.

Using Batch Files to Execute Programs

One of the most common uses for batch files is to execute applications programs. The following sections discuss the methods you can use to set up batch files that execute programs.

Executing Programs from the Program Directory

Batch files are especially handy to use with programs that must be executed from the directory that contains the program files, such as Lotus 1-2-3. If the 1-2-3 Release 2.2 program files are in the C:\123R22 directory, to execute the program you must type the following commands:

```
C:
CD\123R22
123
```

This operation is an obvious candidate for a batch file. You can call the batch file 123.BAT, 123R22.BAT, R22.BAT, or anything else that you prefer. Use the Editor to create this file, and put the file in your \BATCH directory.

If you call the batch file 123.BAT, aren't you breaking the rule about not naming batch files with the same name as a program file? Yes, but it works in this case because the 123 program directory is *not* part of the search path. If you are in any directory except the 123R22 directory, you execute the batch file. If you are in the 123R22 directory, however, you execute the program, which is all you want to do anyway, so the effect is exactly the same. A safer name choice for the batch file may be R22.BAT, to avoid any possible confusion.

When you execute 1-2-3, you can specify an alternate settings file. To enable this option with the batch file, add a replaceable parameter. You learned about replaceable parameters in Chapter 9. Replaceable parameters work in batch files exactly the same way they do in the Program Properties dialog boxes. R22.BAT becomes the following:

```
C:
CD\123R22
123 %1
```


To run 1-2-3 with a settings file named VGA43 with a 43-line display, for example, type the following:

```
R22 VGA43
```

Whatever you type to the right of the space after R22 replaces the %1 in the batch file, and the final line of the batch file executes as if you had typed

```
123 VGA43
```

If you do not include anything to replace the %1, DOS just ignores it completely. In the Shell, when you use a replaceable parameter, DOS pauses and presents you with a dialog box before it starts the program.

Using a Batch File to Run Programs from Associations

In Chapter 8, you learned how to run programs from the Shell using associations. You associate a file extension with a program. Then when you open a file with that extension, DOS executes the program and tells the program to load the file automatically. As mentioned before, you cannot use this method with a program such as Lotus 1-2-3 Rel. 2.2 for two reasons:

- You have to start 1-2-3 from its program directory.
- 1-2-3 does not recognize the file name as a data file. Instead the program thinks the data file is a settings file, and you get an error.

You can solve both of these problems with a batch file. The first problem is the easiest and applies to many programs. First, write a batch file, such as the R22.BAT example, and associate the file extension with the batch file, not the program. But in this case, the batch file won't work because of the second problem. To solve the second problem, you have to read the program manual and find out how to specify a data file to load when you start the program.

For 1-2-3 to load a worksheet automatically, you must precede the file name with -w. To start 1-2-3 and load the SAMPLE.WK1 worksheet file without a batch file, for example, type

```
C:
CD\123R22
123 -wSAMPLE
```

Using the R22.BAT file to start the program, type

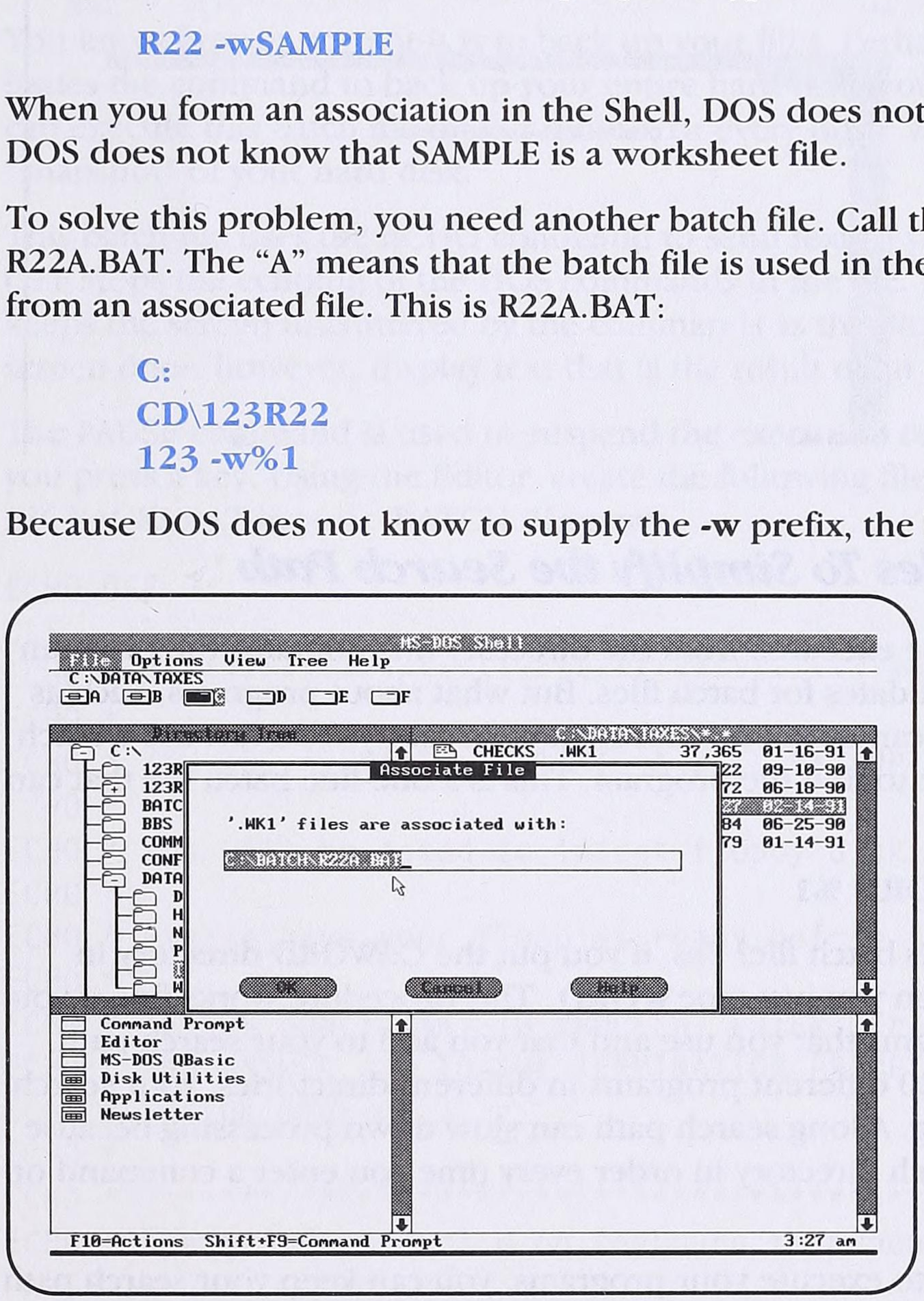
```
R22 -wSAMPLE
```

When you form an association in the Shell, DOS does not know about the **-w**. DOS does not know that SAMPLE is a worksheet file.

To solve this problem, you need another batch file. Call this batch file R22A.BAT. The "A" means that the batch file is used in the Shell to start 1-2-3 from an associated file. This is R22A.BAT:

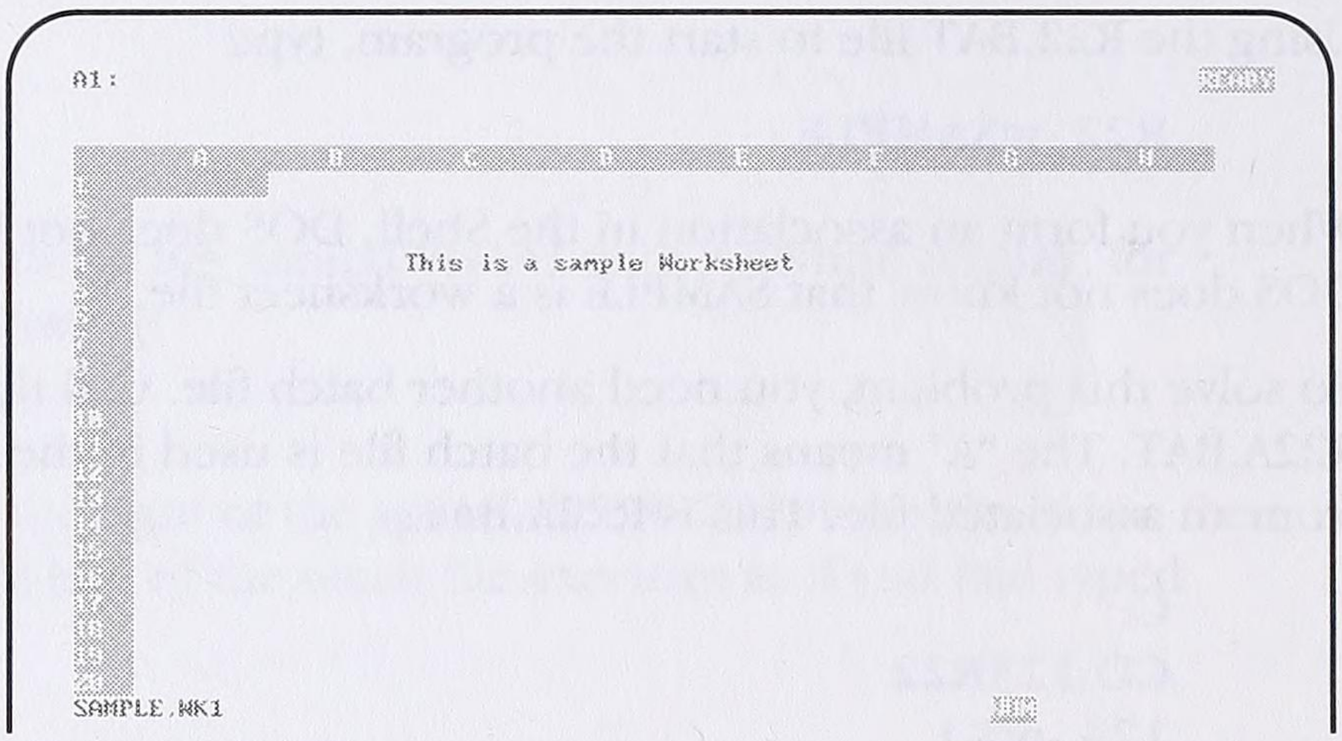
```
C:
CD\123R22
123 -w%1
```

Because DOS does not know to supply the **-w** prefix, the batch file supplies it.



To associate a file extension, select a file with that extension and choose Associate from the File menu. Then type the path and name of the batch file including the .BAT extension, and choose OK.

To execute 1-2-3 and automatically load a worksheet, double click on the worksheet file name or highlight the worksheet and choose Open from the File menu.



1-2-3 executed and automatically loaded the selected worksheet file.

Using Batch Files To Simplify the Search Path

Programs that must be executed from the directory that contains the program files are obvious candidates for batch files. But what about programs, such as Microsoft Word, that can be executed from any directory? You can use a batch file to tell DOS where to find the program. This is a one-line batch file that can be called MSW.BAT:

```
C:\WORD\WORD %1
```

Can you eliminate this batch file? Yes, if you put the C:\WORD directory in your search path. Then you just type **WORD**. This procedure works fine if you have just a few programs that you use and that you add to your search path. But if you use 10 or 20 different programs in different directories, your search path can get very long. A long search path can slow down processing because DOS has to search each directory in order every time you enter a command or program name.

If you use batch files to execute your programs, you can keep your search path short when you run programs from the command line. If you usually use the Shell to run programs, you do not need batch files to put the program directories in the search path. You just specify the complete path in the Program Properties dialog box when you set up the program in a program group, and DOS knows where to find the program. This procedure is discussed in Chapter 8.

Simplified Backup Using a Batch File

You know how important it is to back up your files. Perhaps a batch file that issues the command to back up your entire hard disk would be useful. You can execute this batch file once a month, or every other week, to keep a "snapshot" of your hard disk.

This batch file uses the ECHO command to send text to your display. ECHO OFF stops the echoing of the DOS commands in the file. Using ECHO OFF keeps the screen uncluttered by the commands as the file executes. The screen does, however, display text that is the result of an ECHO command.

The PAUSE command is used to suspend the execution of the batch file until you press a key. Using the Editor, create the following file named BIGBACKI.BAT in your \BATCH directory:

```
ECHO OFF
CLS
ECHO ************************************************************
ECHO *                                                          *
ECHO * YOU ARE ABOUT TO INITIATE A FULL BACKUP OF YOUR HARD DISK *
ECHO *                                                          *
ECHO * You will be asked to insert floppy disks into drive A.   *
ECHO *                                                          *
ECHO * Please have your floppies ready before proceeding.       *
ECHO *                                                          *
ECHO * IF YOU DON'T WANT TO PROCEED, ENTER Ctrl-C TO STOP       *
ECHO * AND ANSWER 'Y' TO THE TERMINATION PROMPT THAT WILL       *
ECHO * FOLLOW CTRL-C.                                          *
ECHO *                                                          *
ECHO ************************************************************
ECHO ^G (entered as Ctrl-G on keyboard to produce a beep)
PAUSE
CLS
ECHO ** FULL HARD DISK BACKUP IN PROGRESS. . . Ctrl-C to stop   **
ECHO ON
\DOS\BACKUP C:\*.* A:/S
ECHO OFF
CLS
ECHO **          THE FULL BACKUP OPERATION HAS TERMINATED          **
ECHO **             YOU HAVE RETURNED TO THE DOS PROMPT            **
```

You now have in your \BATCH directory the batch file BIGBACK. This file performs a complete backup after you provide some start-up information.

12

A Batch File To Display Help Text

Using the batch file provisions of DOS does not mean that you can include only commands that do DOS jobs. You also can include commands that provide information for you or another user. In this example, text information is echoed to the screen. The text provides help for the COPY command. You can get help on the COPY command in the Shell or by typing **HELP COPY** at the command line. A custom batch file, however, can display the exact help message you want.

You can substitute your own help text for another DOS command using the same method. This batch file is called COPYHELP.BAT. You can see the text by typing **COPYHELP**. Using the Editor, create the following file named COPYHELP.BAT in your \BATCH directory:

```
ECHO OFF
CLS
ECHO ************* COPY COMMAND HELP INFORMATION************************
ECHO * FULL SYNTAX:                                                     *
ECHO *                                                                  *
Echo * COPY sd:\path\filename.ext dd:\path\filename.ext /switches       *
ECHO *    sd=source drive letter, dd=destination drive letter           *
ECHO *    /V=Verify switch                                              *
ECHO *                                                                  *
ECHO * A Space separates Source and Destination file parameters.        *
ECHO *                                                                  *
ECHO *         FILES ARE COPIED FROM SOURCE TO DESTINATION.             *
ECHO * ? wild card matches any character and * matches all char.        *
ECHO *  Wild cards allow copying all files matching command line.       *
ECHO *                                                                  *
ECHO *                  ---COPY EXAMPLES---                             *
ECHO * (1)COPY A:*.* C: (2)COPY\TEMP\MYFILE.123 \KEEP\YOURFILE.XYZ      *
ECHO * (3)COPY MEMO.DOC MEMO.BAK (4)COPY CON AUTOEXEC.BAT (re-          *
ECHO * direction using COPY CON)                                        *
ECHO *                                                                  *
ECHO ************************************************************************
```

Lessons Learned

- The PATH command makes it easier to execute DOS commands and programs.
- The PROMPT command helps you keep track of where you are on a hard disk.
- Batch files are simple but powerful programs in the form of text files.
- Batch files personalize your computer to your own wishes.
- The AUTOEXEC.BAT file is always executed by DOS after CONFIG.SYS to make your computer operate more efficiently.
- The CONFIG.SYS file configures your PC.
- Batch files can make it easier to execute programs, even when you use the Shell.

The next chapter teaches you some more advanced DOS commands.

12

13

More Advanced DOS Commands

The topics in this chapter may appear a bit exotic—even unnecessary—but they are very useful tools in certain circumstances. You may never have to recover a damaged file, but if you do, it's nice to know that it is possible.

This chapter covers DOS devices and redirection. The section on redirection teaches you how to change both the standard source and standard destination of input and output.

As you gain mastery over DOS, you will use the command line more and more. You will learn how to use DOSKEY to make the command line even faster and easier to use.

Memory management may be important to you if you have a 386 computer with extended memory available. This chapter gives you only the most important information about these advanced topics. For more information consult *Que's MS-DOS 5 User's Guide,* Special Edition.

Recovering damaged files

Redirecting the input and output of DOS commands

Creating text files using the CONsole device

Using the command line editor

Memory management

13

Key Terms Used in This Chapter

Bad sector	A sector on a disk that contains a bad spot in the magnetic coating where data cannot be read reliably.
Redirection	Taking input from some place other than the keyboard or sending output to some place other than the screen.
Device	A hardware component or peripheral that DOS can use in some commands as though it were a file.
Console	The device DOS uses for keyboard input and screen output. DOS recognizes the console as CON.
Pipe	A method of taking the output of one command and making it the input for another command in DOS.
Filter	A method of processing the output of a command before displaying it.
Conventional Memory	The main system memory used by DOS and programs. It is usually restricted to 640K bytes.
Reserved Memory	Memory between conventional memory and one megabyte that is used by the computer hardware.
Upper memory blocks	Areas in reserved memory that are not used by the computer hardware.
Expanded Memory	A special type of memory beyond conventional memory that can be used by some programs that are written to recognize it.
Extended Memory	Memory above one megabyte on 286, 386, and 486 computers.
High memory	Refers to reserved memory or memory in upper memory blocks.
Memory-resident program or *TSR*	A program that remains in memory after you execute it, such as the DOS Shell.
RAM disk	A portion of memory that is set up to act like a very fast disk drive.

Recovering Damaged Files

When you save a file in an application program or copy a file with DOS, you expect that file always to be available when you need it. You learned in Chapter 10 that that may not be so. There are many threats to your data, so you must always have a backup copy of every important file.

One threat to your data is a bad spot on the disk itself. Data is magnetically recorded on a very thin coat of iron oxide. The high-speed manufacturing process that coats the platters of a hard disk is not perfect. Many hard disks have a few spots where the oxide coat is thin or imperfect and cannot record data reliably.

When you format a disk, DOS checks the disk surface and marks any sectors that it cannot read as bad sectors. Once a sector is marked bad, DOS makes sure that sector is never used to record data. You can find out the number of bad sectors on a disk when you format the disk or when you execute the CHKDSK command.

A few bad sectors on a hard disk are not a problem. A floppy disk with bad sectors may indicate a problem with the entire disk. Do not use a floppy disk with any bad sectors to store important data.

```
C:\>CHKDSK

Volume DRIVE_C     created 10-03-1990 3:45p
Volume Serial Number is 166D-BDE3

  27553792 bytes total disk space
     75776 bytes in 3 hidden files
    112640 bytes in 48 directories
  24518656 bytes in 916 user files
     20480 bytes in bad sectors
   2826240 bytes available on disk

      2048 bytes in each allocation unit
     13454 total allocation units on disk
      1380 available allocation units on disk

    655360 total bytes memory
    592768 bytes free

C:\>
```

This screen shows that the bytes in bad sectors represent less than 0.1 percent of the total capacity of the disk.

DOS takes care of bad sectors automatically. Unfortunately, a spot on the disk may be marginal, or just good enough to pass the bad-sector test when you format the disk. As you read and write files, DOS may no longer be able to read data from this spot. A marginal sector has become a bad sector.

When DOS tries to read data from a bad sector, it returns an error. The error message is usually `sector not found` or `seek error`. The worst time to get this message is when you try to make a backup copy of the file.

If the unreadable file contains mostly text, such as a word processing file, you may be able to recover most of the data. The RECOVER command reads the file one sector at a time and restores the part of the file that can be read. The part of the file in the bad sector is lost. The format is as follows:

RECOVER filespec

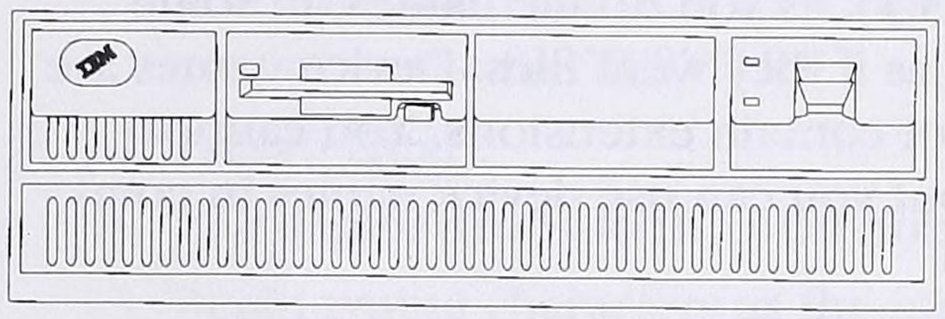
In most cases, the filespec is the name of the file that you want to recover. Although filespec may be a directory, or even an entire disk, you should recover one file at a time. No matter where the file started originally, RECOVER puts the recovered file in the root directory with the name FILE*nnnn*.REC. The *nnnn* is a sequential number starting with 0001. If you recover one file at a time, you can then rename the file to its correct name. If you try to recover multiple files at once, you will have to read through each FILE*nnnn*.REC to determine which file is which.

After you recover a file, use your word processor or the DOS Editor to determine what data is missing and reenter the data. You may get an error when you try to read the file into a word processor, such as `Incomplete file` or `Invalid file format` because of the missing data. If the program refuses to accept the file, use the DOS Editor to delete all the non-text formatting information and read the file into your word processor as a text file. You will have to reenter all format information.

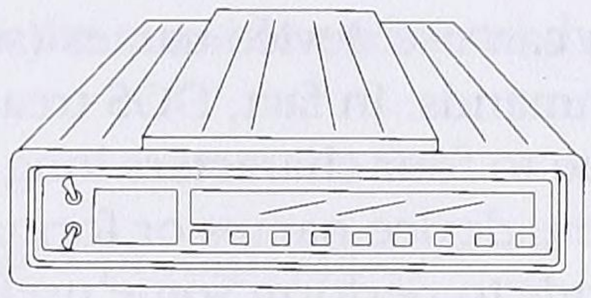
If the recovered file is a database or a spreadsheet, you may be able to use the recovered file, or the program may just reject it—it depends on what part of the file was lost. If the recovered file is a program, the recovered file is useless. Do not try to rename and execute a recovered program file. If you try to execute an incomplete program, the results are unpredictable and could be disastrous.

DOS Devices and Redirection

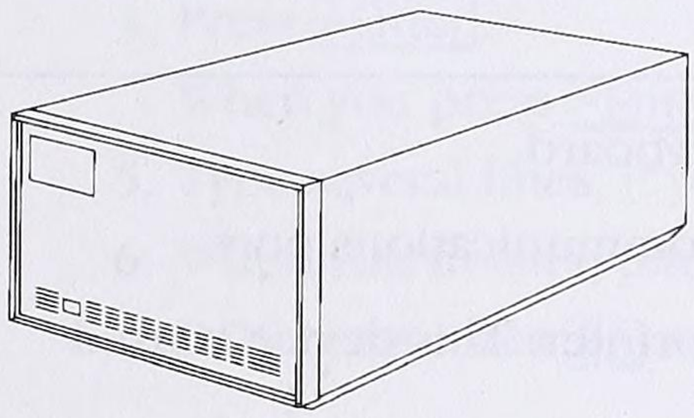
In DOS, the term *redirection* means to change the source or destination normally used for input and output. The standard source of input is the keyboard. The standard output location is the screen display. When you use the keyboard to type a command, COMMAND.COM carries the text or messages and displays them on-screen. In DOS, the keyboard and display are the standard, or default, devices for messages, prompts, and input.



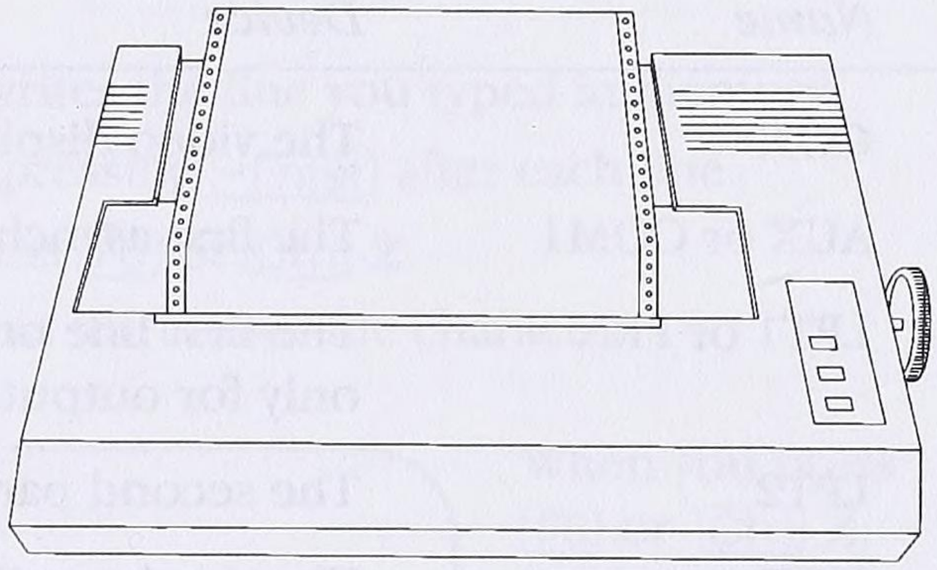
System unit—input/output



Modem—input/output

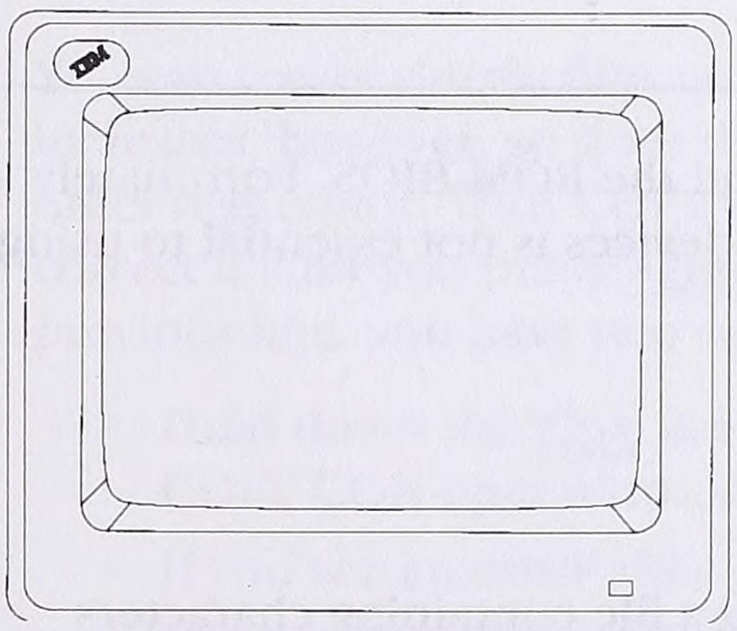


Disk drive—input/output

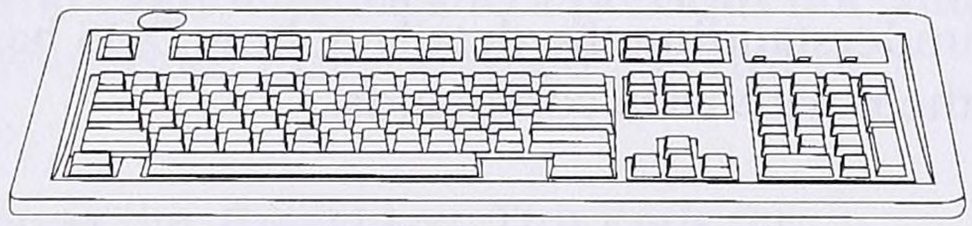


Printer—output

DOS views devices as extensions of the main unit of the computer. Some devices send input and receive output. Other devices are used for input only (the keyboard) or output only (the video display or printer).



Display



Keyboard

Disk drives are both input and output devices. Keyboards are input devices; displays and printer adapters are output devices. Serial adapters can send output and receive input.

You can use device names (see table 13.1), as you do file names, in some commands. In fact, DOS treats devices as if they were files. Device names are three to four characters long and do not contain extensions. You cannot delete device names or format them, but you can use device names in commands to perform some useful actions.

Table 13.1
DOS Device Names

Name	*Device*
CON	The video display and keyboard.
AUX or COM1	The first asynchronous communications port.
LPT1 or PRN	The first line or parallel printer. This device is used only for output.
LPT2	The second parallel printer.
LPT3	The third parallel printer.
COM2	The second asynchronous port.
COM3	The third asynchronous port.
COM4	The fourth asynchronous port.
NUL	A dummy device (for redirecting output to "nowhere.")

DOS controls devices through its system files and the ROM BIOS. Fortunately, understanding the details of how DOS handles devices is not essential to using them with DOS commands.

The COPY CON Device

A useful application for a DOS device is creating a file containing characters you enter directly from the keyboard. To do so, you use the familiar COPY command. This time, however, you copy data from CON, the *CONsole* device.

CON, as an input device, is DOS's device name for the keyboard. In this case, suppose that you want to create a file named TEST.TXT. Follow these steps to send characters directly to the file:

1. At the DOS prompt type the following command:

   COPY CON TEST.TXT

You have just told DOS to "Copy data from the console and send the output to the file TEST.TXT."

2. Press Enter.

   The cursor drops to the next line and no DOS prompt appears.

3. Begin typing characters as the input to the file. For example, type the following text:

   This is a file copied from a device to a disk file.

4. Press Enter.

   When you press Enter, DOS writes the line you typed in memory.

5. Type several lines, if you want, pressing Enter after each line.

6. When you finish typing text, press F6 or Ctrl-Z.

   DOS recognizes F6 or Ctrl-Z. as the end-of-file character.

```
C:\DATA\WORK>COPY CON TEST.TXT
This is a file copied from a  device to a disk file.
^Z
        1 file(s) copied

C:\DATA\WORK>
```

When you press F6 or Ctrl-Z, DOS saves the information you typed as a new file and displays the `1 File(s) copied` message.

You can create simple files quickly with this method. As the length of a file increases, however, so does the desirability of using the DOS Editor or another text editor. With COPY CON, you cannot go back to a previous line and correct it after you press Enter. If you notice that you typed an error on a previous line, you have two options:

- Hold down the Ctrl key and press the Break key. This ends the COPY CON operation. All the characters you typed will be lost.
- If you see an error after you saved the file, either delete the file and start over or use a text editor to correct the mistake.

Remember to close your file, either with the F6 key or the Ctrl-Z keys. Until you close the file, DOS assumes that you are still typing characters into the file.

To verify that the file is correct, use TYPE to list the file.

You have just entered a text file into your computer using a DOS command and a device name.

Redirection

You must use special redirection symbols to tell DOS to use non-default devices in a command. Table 13.2 lists the symbols DOS recognizes for redirection.

Table 13.2
Symbols for Redirection

<	Redirects a program's input.
>	Redirects a program's output.
>>	Redirects a program's output but adds the text to an established file, if it exists.

The < symbol points away from the device or file and says, "Take input from here." The > symbol points toward the device or file and says, "Put output there." The >> symbol redirects a program's output, but adds the text to an established file. When you issue a redirection command, place the redirection symbol after the DOS command, but before the device name.

Redirecting to a Printer

Wouldn't it be practical to get the output of a DIR or TREE command on your printer? You can by redirecting output to the device PRN (the printer). Make sure that you have the printer turned on and connected to your computer. Type

```
DIR /W > PRN
```

When you press ↵Enter, the output of the DIR command goes to the printer. The /W (wide display) switch lists the files in five columns. You can tuck such a printout into the sleeve of a floppy disk to identify the contents of a disk. If you entered text into the TEST.TXT file and your printer is ready, type the following command:

```
TYPE TEST.TXT > PRN
```

You now have a printed copy of the TEST.TXT file.

A more efficient way to print a text file is to copy the file to the PRN device. Type **COPY TEST.TXT PRN**.

Never try to redirect binary files to the printer. Redirecting binary data can result in paper feed problems, beeps, meaningless graphics characters, and

maybe a locked computer. If you get hung up, you can do a warm boot or turn the power switch off and then on again. If you must turn your computer off, it is good practice to wait about 15 seconds before turning it back on.

Redirecting to a File

When you use commands, such as DIR or TREE, the result displays on-screen, and then it is gone. As you just learned, it is simple to redirect a listing to a printer for a permanent printed record. You also can redirect the listing to a file for a permanent record on your disk. To store a listing of all the directories on your C drive in a file named TREE.TXT, use the following command:

```
TREE C:\ > TREE.TXT
```

You now have a permanent record of the structure of your hard disk at the time you created the file. To store a listing of all the directories and files on your C drive in a file named TREEFILE.TXT, use the following command:

```
TREE C:\ /F > TREEFILE.TXT
```

Pipes and Filters

The output of one command can be presented as the input of another command. The pipe symbol (|) presents, or pipes, output from one commands to another. (By the way, don't confuse the pipe symbol with the colon symbol. The pipe symbol is on the same key as the backslash. Books often print the pipe symbol as a single vertical dash but on the keyboard and on your display, it is two stacked vertical dashes.) The FIND, SORT, and MORE commands are filters. A filter is a program that gets data from the standard input, changes the data, and then writes the modified data to the display.

FIND, SORT, and MORE accept the output of a DOS command and do further processing on that output. FIND outputs lines that match characters given on the command line. SORT alphabetizes output. MORE displays a prompt when each screen of the output is full.

Using the FIND Filter

One handy way of using the FIND filter is to display a directory listing showing only the files that contain certain characters in its file name. To list just the files that contain *TAX* in their file names, use the following command:

```
DIR | FIND "TAX"
```

The FIND command filters the output of a DIR command. FIND displays on-screen only the lines that contain TAX. The | symbol pipes the output of DIR to FIND.

```
 Volume Serial Number is 166D-BDE3
 Directory of C:\DATA\TAXES

.            <DIR>      01-28-91   3:18p
..           <DIR>      01-28-91   3:18p
CHECKS   WK1      37365 01-16-91   1:14p
INCOME   WK1       3622 09-10-90   1:50p
LOG      DOC       3072 06-18-90  11:41a
SAMPLE   WK1       1427 02-14-91   3:24a
STATEMNT WK1       3384 06-25-90   4:21p
TAXEST   WK1       5379 01-14-91   2:53p
1991TAX  DOC        223 03-15-91   3:56p
92TAX    WK1        252 03-15-91   3:57p
STATE    TAX        440 03-15-91   3:58p
       11 file(s)      55164 bytes
                     2824192 bytes free

C:\DATA\TAXES>DIR | FIND "TAX"
 Directory of C:\DATA\TAXES
TAXEST   WK1       5379 01-14-91   2:53p
1991TAX  DOC        223 03-15-91   3:56p
92TAX    WK1        252 03-15-91   3:57p
STATE    TAX        440 03-15-91   3:58p

C:\DATA\TAXES>
```

Using the SORT Filter

The SORT command is a filter that alphabetizes input. In the following command, the output of the TYPE command is piped to SORT:

```
TYPE NAMES.TXT | SORT
```

When the listing filtered by SORT is displayed on-screen, it is in alphabetical order.

```
C:\DATA\DOCS>TYPE NAMES.TXT
Mallory
Lee
Wouk
Laun
Anderson
Kincaid
Shaw
Hofstadter
Andersen

C:\DATA\DOCS>TYPE NAMES.TXT | SORT
Andersen
Anderson
Hofstadter
Kincaid
Laun
Lee
Mallory
Shaw
Wouk

C:\DATA\DOCS>
```

The main use for the SORT filter with earlier versions of DOS was to sort a directory listing. With DOS 5, to sort a directory listing by file name use the /ON switch as follows:

```
DIR /ON
```

Using the MORE Filter

If a file is so long that the text scrolls off the screen, you can pause the display by pressing Ctrl-S (or with the Pause key on Enhanced keyboards). If you have a fast computer, it may be very difficult to press the Pause key at the right time, and information may scroll off the screen before you can read it. The MORE filter provides a better solution to this problem. MORE displays information one screen at a time.

To see how MORE works, change to your DOS directory. (It is probably C:\DOS.) Enter the following command:

```
TYPE README.TXT | MORE
```

MORE displays 23 lines of text and pauses while displaying the message `--More--`. When you press any key, MORE displays the next screen of text.

```
README.TXT

NOTES ON MS-DOS VERSION 5.0
===========================

This document provides important information that is not included
in the Microsoft MS-DOS User's Guide and Reference or in online
Help. The following topics are covered:

1. How MS-DOS 5.0 Modifies Your System
   1.1 LINK.EXE Versions May Be Left in Path
   1.2 WINA20.386 File
2. Solving Setup Problems
   2.1 Priam and Everex Hard Disks
   2.2 Syquest Removable Hard Disk
   2.3 Bernoulli Drives
   2.4 Disk Manager
   2.5 Speedstor and Volume Expansion
   2.6 Novell Partitions
   2.7 Vfeature Deluxe
   2.8 Difficulty Specifying a DOS Path
   2.9 Incompatible Partition
-- More --
```

The MORE filter solves the problem of text scrolling off the screen before you can read it.

If you want to read a long text file, it may be easier to use the DOS Editor. With the Editor, you can use the PgUp and PgDn keys to scroll the text. With MORE, once a screenful of text scrolls off the screen, you cannot scroll back to see it again. To read README.TXT, use the command **EDIT README.TXT**.

13 Using DOSKEY, the Command Line Editor

One of the advantages of using the command line instead of the DOS Shell is that it usually is faster to type the command than to use the menus. The DOS Shell menus are much easier to use, however. The DOS Shell is the best way to learn how to use DOS commands.

Once you are familiar with the common DOS commands, you may find yourself using the command line more often. When you use the command line, you find that you repeat many commands over and over, sometimes with slight variations. With the new command line editor, DOSKEY, you can recall previous commands without retyping them. At times, you may type a long command and make an error. Whether you catch the error before or after you press ↵Enter, you can correct the error without retyping the entire command.

DOS experts have been using command line editors for years. Now one is part of DOS 5 and is available to everyone.

DOSKEY is not built into COMMAND.COM. Before you can use the DOSKEY features, you must load it into memory. At the prompt, type **DOSKEY** and press ↵Enter.

DOSKEY is loaded into memory with a 512-byte buffer. This buffer is a portion of memory where DOSKEY stores your commands. As long as a command is in the buffer, you can recall the command without retyping it. When the buffer fills up, every time you enter a new command, DOSKEY deletes the oldest command in the buffer.

You have to enter the DOSKEY command only once. If you plan to use DOSKEY regularly, you can put the command in your AUTOEXEC.BAT file. The AUTOEXEC.BAT file is covered in Chapter 12.

Recalling Previous Commands with DOSKEY

When DOSKEY is loaded, to recall the last command entered, press the ↑ key. To recall an earlier command, continue to press the ↑ key until DOS displays the command you want. If you press the ↑ key too many times and

you go past the command you want, press the ↓ key to recall the next command in the buffer. To clear the command line so that you can enter a command from scratch, press the Esc key.

Suppose, for example, that you entered the following commands:

```
C:
CD\DATA\DOCS
FORMAT A: /Q
COPY *.* A:
```

These commands make the DATA\DOCS directory the current directory, quick format a floppy disk in the A drive, and then copy all the files from the DATA\DOCS directory to the floppy disk in drive A.

When the copy procedure is completed, DOS displays the DOS prompt. You want to repeat this process for the DATA\TAXES directory. You can retype each command, or you can recall the previous commands without retyping them.

```
Volume label (11 characters, ENTER for none)?

    362496 bytes total disk space
    362496 bytes available on disk

      1024 bytes in each allocation unit.
       354 allocation units available on disk.

Volume Serial Number is 385B-16E4

QuickFormat another (Y/N)?N


C:\DATA\DOCS>COPY *.* A:
SAMPLE.DOC
SAMPLE.TXT
SAMPLE2.TXT
SAMPLE3.TXT
SCHEDULE.DOC
NAMES.TXT
NAMES.BAK
TEMP
        8 file(s) copied

C:\DATA\DOCS>COPY *.* A:
```

When you press the ↑ key once, you recall the last command entered: COPY *.* A:.

13

When you press the ↑ key three times, you recall the third-from-the-last command entered.

```
Volume label (11 characters, ENTER for none)?

    362496 bytes total disk space
    362496 bytes available on disk

      1024 bytes in each allocation unit.
       354 allocation units available on disk.

Volume Serial Number is 385B-16E4

QuickFormat another (Y/N)?N


C:\DATA\DOCS>COPY *.* A:
SAMPLE.DOC
SAMPLE.TXT
SAMPLE2.TXT
SAMPLE3.TXT
SCHEDULE.DOC
NAMES.TXT
NAMES.BAK
TEMP
        8 file(s) copied

C:\DATA\DOCS>CD\DATA\DOCS
```

After you recall a previous command, you can press ↵Enter to execute it again, or you can edit or change the command before you execute it. If you recall the command CD\DATA\DOCS and you want to change it to CD\DATA\TAXES, press the ←Backspace key four times to erase DOCS, then type **TAXES** and press ↵Enter.

After you recall a previous command, you can edit the command and execute it. The recalled command changed to the CD\DATA\DOCS directory. The edited command changes to the CD\DATA\TAXES directory.

```
Volume label (11 characters, ENTER for none)?

    362496 bytes total disk space
    362496 bytes available on disk

      1024 bytes in each allocation unit.
       354 allocation units available on disk.

Volume Serial Number is 385B-16E4

QuickFormat another (Y/N)?N


C:\DATA\DOCS>COPY *.* A:
SAMPLE.DOC
SAMPLE.TXT
SAMPLE2.TXT
SAMPLE3.TXT
SCHEDULE.DOC
NAMES.TXT
NAMES.BAK
TEMP
        8 file(s) copied

C:\DATA\DOCS>CD\DATA\TAXES
```

To repeat the format command, press the ↑ key three times. The first press recalls `CD\DATA\TAXES`, the second press recalls `COPY *.* A:`, and the third press recalls `FORMAT A:/Q`. Because you do not want to change this command in any way, just press ↵Enter to quick format another floppy disk.

To repeat the copy command, press the ↑ key three times. The first time recalls `FORMAT A:/Q`, the second time recalls `CD\DATA\TAXES`, and the third time recalls `COPY *.* A:`.

Because you do not want to change this command in any way, just press ↵Enter to copy all the files from the DATA\TAXES directory to the floppy disk.

You use the ↑ key when you want to recall a recently used command. Sometime you may want to recall a command that you used 10 or 20 commands ago. You could press the ↑ key 10 or 20 times, but there is an easier way. The F7 key displays all the commands in the DOSKEY buffer.

```
QuickFormat another (Y/N)?N


C:\DATA\TAXES>COPY *.* A:
CHECKS.WK1
INCOME.WK1
LOG.DOC
SAMPLE.WK1
STATEMNT.WK1
TAXEST.WK1
1991TAX.DOC
92TAX.WK1
STATE.TAX
        9 file(s) copied

C:\DATA\TAXES>
1: C:
2: CD\DATA\DOCS
3: FORMAT A: /Q
4: COPY *.* A:
5: CD\DATA\TAXES
6: FORMAT A: /Q
7: COPY *.* A:
C:\DATA\TAXES>Line number: 6
```

When you press the F7 key, DOS displays all the commands in the DOSKEY buffer. To recall any command in the list, press F9, and type the line number of the command you want to recall. To recall the quick format command, press F9, type 6, and press ↵Enter.

13

After you press F9, type 6, and press ↵Enter, the command at line number 6 is recalled.

```
QuickFormat another (Y/N)?N


C:\DATA\TAXES>COPY *.* A:
CHECKS.WK1
INCOME.WK1
LOG.DOC
SAMPLE.WK1
STATEMNT.WK1
TAXEST.WK1
1991TAX.DOC
92TAX.WK1
STATE.TAX
        9 file(s) copied

C:\DATA\TAXES>
1: C:
2: CD\DATA\DOCS
3: FORMAT A: /Q
4: COPY *.* A:
5: CD\DATA\TAXES
6: FORMAT A: /Q
7: COPY *.* A:
C:\DATA\TAXES>FORMAT A: /Q
```

If the buffer contains more than 23 commands, the first 23 commands are listed when you press F7. If you see the command that you want to recall, remember its line number and press any key at the `-- More --` prompt to scroll the display.

```
C:\DATA>
1: C:
2: CD\DATA\DOCS
3: FORMAT A: /Q
4: COPY *.* A:
5: CD\DATA\TAXES
6: FORMAT A: /Q
7: COPY *.* A:
8: CD\DATA
9: DIR
10: CD HOMEFIN
11: FORMAT A: /Q
12: COPY *.* A:
13: CD\DOS
14: TYPE README.TXT | MORE
15: CD\
16: TYPE AUTOEXEC.BAT
17: TYPE CONFIG.SYS
18: CD DATA
19: DIR /AD
20: CD WORK
21: DIR
22: DEL TEST.TXT
23: CD \DATA
-- More --
```

When DOS has displayed the entire list of commands, press F9 and the line number of the command to recall. Then press ↵Enter.

There is one more way to recall a command. Type one or more characters at the start of the command and press the F8 key. DOS searches the buffer, starting with the most recent command, for a command that starts with the characters you typed. If it finds a match, that command is recalled.

```
7: COPY *.* A:
8: CD\DATA
9: DIR
10: CD HOMEFIN
11: FORMAT A: /Q
12: COPY *.* A:
13: CD\DOS
14: TYPE README.TXT | MORE
15: CD\
16: TYPE AUTOEXEC.BAT
17: TYPE CONFIG.SYS
18: CD DATA
19: DIR /AD
20: CD WORK
21: DIR
22: DEL TEST.TXT
23: CD \DATA
-- More --
24: DIR
25: CD PERSONAL
26: DIR
27: COPY *.* A:
28: CD \DATA
29: CLS
C:\DATA>F
```

To recall a command, type one or more characters at the beginning of the command. If you type just the letter **F**, DOS searches for the most recent command that starts with an *F*.

```
7: COPY *.* A:
8: CD\DATA
9: DIR
10: CD HOMEFIN
11: FORMAT A: /Q
12: COPY *.* A:
13: CD\DOS
14: TYPE README.TXT | MORE
15: CD\
16: TYPE AUTOEXEC.BAT
17: TYPE CONFIG.SYS
18: CD DATA
19: DIR /AD
20: CD WORK
21: DIR
22: DEL TEST.TXT
23: CD \DATA
-- More --
24: DIR
25: CD PERSONAL
26: DIR
27: COPY *.* A:
28: CD \DATA
29: CLS
C:\DATA>FORMAT A: /Q
```

After you type one or more characters at the beginning of the command, press F8 and the most recent command that starts with the characters you typed is recalled. After typing an **F** and pressing F8, DOS recalled the most recent FORMAT command.

Table 13.3 lists all the commands that you can use with DOSKEY to recall commands.

Table 13.3
Keys to Recall Previous Commands

Key	*Action*
↑	Recalls the previous command.
↓	Recalls the next command.
Esc	Clears the command line.
PgUp	Recalls the oldest command.
PgDn	Recalls the most recent command.
F7	Displays the list of all commands in the buffer.
F8	Searches the buffer for a command that starts with the text that you enter.
F9	Recalls the command at the line number that you enter.
Alt-F7	Clears the entire DOSKEY buffer.

Editing Previous Commands with DOSKEY

Once you recall a command, you can edit the command before you execute it. You already learned to use the ←Backspace key to erase characters at the end of the command. DOSKEY also provides a line editor that enables you to change any part of the command. Table 13.4 lists all the DOSKEY editing keys. Editing a command is similar to editing a line of text with the DOS Editor or a word processor. The only difference is that you can only edit one line.

Suppose, for example, that you execute the following command:

```
COPY *.DOC D:\BACKUP
```

You also want to copy all the files with a.WK1 extension to the D:\BACKUP directory. Follow these steps:

1. Press the ↑ key once to recall the COPY command.
2. Press Home to move the cursor to the beginning of the command line.
3. Press → six times to move to cursor to the *D* in *DOC*.
4. Type **WK1** in place of *DOC*.
5. Press ↵Enter to execute the command.

Table 13.4
DOSKEY Editing Keys

Key	*Action*
Home	Moves the cursor to the beginning of the command.
End	Moves the cursor to the end of the command.
←	Moves the cursor one character to the left.
→	Moves the cursor one character to the right.
Ctrl-←	Moves the cursor one word to the left.
Ctrl-→	Moves the cursor one word to the right.
←Backspace	Deletes one character to the left of the cursor.
Del	Deletes one character at the cursor position.
Ctrl-End	Deletes all characters from the cursor to the end of the command.
Ctrl-Home	Deletes all characters from the cursor to the beginning of the command.
Ins	Toggles between Overtype and Insert modes. In Overtype mode, everything you type replaces a character. In Insert mode, the cursor changes from an underline line to a square block. and everything you type is inserted at the cursor.
Esc	Clears the command line.

DOSKEY has other features that are outside the scope of this book. You can find out more about DOSKEY in *Que's MS-DOS 5 User's Guide*, Special Edition.

Managing Memory

A few years ago, managing memory was not an issue. Today, however, memory management can be a significant factor in using your personal computer efficiently.

If you have a PC or XT or compatible with an 8088 or 8086 microprocessor, then you can skip this section. If you have a 286 computer (also known as an AT-class computer) with an 80286 microprocessor, memory management can effect you. If you have a 386 or 486 computer, memory management can be very important.

13

Memory management can be a very complex subject. This book covers only part of the topic of optimizing your computer's performance. You can find out more about memory management in *Que's MS-DOS 5 User's Guide,* Special Edition.

Types of Memory

There are several different types of memory that you can have in your computer, as follows:

- **Conventional memory** is the main system memory that all personal computers use to run DOS and programs. It is sometimes called *DOS memory*. With DOS, conventional memory is limited to 640K bytes. Almost all computers today have the maximum conventional memory. Many application programs require or recommend a full 640K.
- **Reserved memory** is the 384K bytes of memory between the 640K conventional memory and one megabyte. All personal computers use the reserved memory area for the ROM BIOS, video memory, and adapter cards, such as disk controllers and network boards.

  Another name for reserved memory is *upper memory.* Although an 384K area is reserved, the entire area is not used by the computer. Sections, or blocks of memory in this area that are not used are called *upper memory blocks*. With 386 and 486 computers, it is possible to use these upper memory blocks to increase the size of available conventional memory.
- **Expanded memory** is a special type of additional memory that allows some programs to use memory beyond the 640K limit of conventional memory. Expanded memory is sometimes abbreviated EMS memory. To make use of expanded memory, you need a special expanded memory expansion board, special software known as an expanded memory manager that makes the expanded memory available to the applications program, and an applications program that is written to use expanded memory.

Some computers come with expanded memory and do not require an expansion board. All 386 and 486 computers have expanded memory capability built-in, but require special software called an *expanded memory emulator* to activate it.

- **Extended memory** is memory above one megabyte. Only 286, 386, and 486 personal computers can have extended memory. Extended memory is sometimes abbreviated *XMS* memory. Because DOS, in general, was designed to operate with only conventional memory, most programs cannot use extended memory. DOS is, however, evolving toward using extended memory and the most powerful applications now use it. Extended memory is faster and cheaper than expanded memory.

  Because extended memory support is not built into DOS, some programs require an extended memory manager. DOS 5 comes with an extended memory manager called HIMEM.SYS. HIMEM.SYS is added to your CONFIG.SYS file during installation if you have extended memory.

  Some DOS programs, such as Paradox 3.5 and Lotus 1-2-3 Release 3.1, have their own extended memory managers built-in.

In most cases, using conventional, reserved, and expanded memory is straightforward and is handled by DOS and your application programs. The most important memory management issue is how to best use extended memory. Many personal computers have three or more megabytes of extended memory. How you use these megabytes determines how fast and how effective your computer is. One major goal of memory management is to free as much conventional memory as possible for application programs.

Using the HIMEM Extended Memory Manager

If you have extended memory, DOS adds the HIMEM device driver to your CONFIG.SYS file during installation. This process is automatic. The standard statement is as follows:

```
DEVICE = C:\DOS\HIMEM.SYS
```

If you add any other statements to CONFIG.SYS that use extended memory, make sure that you put them after the HIMEM device driver.

Some computers need special handling to manage their extended memory. These computers need a special /MACHINE:*xxxxx* parameter to operate properly. *xxxxx* is the machine code. The possible values are as follows:

Machine code	*Computer*
AT	IBM AT
PS2	IBM PS/2
PT1CASCADE	Computer with a Phoenix Cascade BIOS
HPVECTRA	HP "Classic" Vectra
ATT6300PLUS	AT&T 6300 Plus
ACER1100	Acer 1100
TOSHIBA	Toshiba 1600 or 1200XE
WYSE	Wyse 12.5 MHz 286 with Micro Channel

If you don't include machine code, HIMEM defaults to AT, which applies to most 286, 386, and 486 computers. If your computer is one of those mentioned (other than an AT), add the /MACHINE: parameter to your HIMEM statement. If you have an IBM/PS2, the HIMEM statement is as follows:

```
DEVICE = C:\DOS\HIMEM.SYS /MACHINE:PS2
```

If you have problems when you boot your computer with HIMEM, read the README.TXT file in your C:\DOS directory. There may be additional information in this file with installation instructions for your computer.

Using EMM386

If you have a 386 or 486 computer with extended memory, you can use the EMM386 device driver in your CONFIG.SYS file to configure some or all of the extended memory as expanded memory. Expanded memory is slower than extended memory, but many application programs cannot use extended memory.

If you use a program that can use expanded memory, such as 1-2-3 Release 2.2, you can build much larger spreadsheets if you make some extended memory available to it as expanded memory.

The basic syntax to convert extended memory to expanded memory is as follows:

```
DEVICE = C:\DOS\EMM386.EXE nnnn
```

The *nnnn* parameter is the number of kilobytes to convert to expanded memory. To convert 512KB of extended memory to expanded memory, use the following statement in your CONFIG.SYS file:

```
DEVICE = C:\DOS\EMM386.EXE 512
```

Loading Drivers and Programs into High Memory

The term *high memory* refers to upper memory blocks in reserved memory. If you load some drivers and programs into high memory, you free conventional memory for other programs.

If you have extended memory, DOS adds the following statement to your CONFIG.SYS file during installation:

```
DOS=HIGH
```

This process is automatic. With part of DOS in extended memory, there is more conventional memory for programs. In this case, HIGH refers to the High Memory Area (HMA), which is the first 64K of extended memory.

You can load drivers and programs into any upper memory blocks that are available. Whether upper memory blocks are available and their size depends on your hardware configuration. The more adapter cards in your computer, the less upper memory block memory is available.

Enabling High Memory Support

Before you can load drivers and programs into high memory, you must have two statements in CONFIG.SYS.

- The DOS=HIGH statement must be changed as follows:

  DOS=HIGH,UMB

  The UMB parameter maintains upper memory block support.
- The DEVICE = C:\DOS\EMM386.EXE statement is required even if you do not want to convert any extended memory to expanded memory. If you do convert extended memory to expanded memory, change the statement to:

  DEVICE = C:\DOS\EMM386.EXE *nnnn* RAM

  The RAM parameter activates upper memory block support. If you do not convert extended memory to expanded memory, add the following statement:

  DEVICE = C:\DOS\EMM386.EXE NOEMS

  The NOEMS parameter uses EMM386 to activate upper memory block support but does not convert any extended memory to expanded memory.

With these statements in your CONFIG.SYS file, you can now load drivers and programs into high memory.

Using DEVICEHIGH

To load a device driver into high memory instead of conventional memory, change the `DEVICE=` statement in your CONFIG.SYS file to `DEVICEHIGH=`. Do not use DEVICEHIGH for HIMEM or EMM386.

You can load all the device drivers that come with DOS with either DEVICE or DEVICEHIGH. Other device drivers that come with other hardware in your computer may or may not work. If DEVICEHIGH does not load the driver, use DEVICE. Following are examples of using this command:

DEVICEHIGH=C:\DOS\EGA.SYS

DEVICEHIGH=C:\DOS\RAMDRIVE.SYS *nnnn* /e

If you have a mouse driver in the UTIL directory, the following command should work:

DEVICEHIGH=C:\UTIL\MOUSE.SYS

If DOS runs out of high memory, it ignores the DEVICEHIGH and treats it as a DEVICE statement.

Using LOADHIGH

You can use a number of memory-resident programs with DOS. A *memory-resident* program is a program that remains in memory while you run other programs. Examples are DOSSHELL and DOSKEY. Another name for a memory-resident program is a *TSR*, or terminate-and-stay-resident program. This means that after you execute the program, it stays resident in memory.

To load a TSR into high memory use the LOADHIGH command before the name of the program. To load DOSKEY into high memory use the following command:

```
LOADHIGH DOSKEY
```

You usually load TSR programs in your AUTOEXEC.BAT file.

You can load any of the TSR programs that come with DOS into high memory. Other TSR programs may or may not work. If LOADHIGH does not successfully load the program, then just delete *LOADHIGH* and load the program into conventional memory.

If DOS runs out of high memory, it ignores the LOADHIGH and loads the program into conventional memory.

Using RAMDrive

RAMDrive is a device driver that you put in your CONFIG.SYS file to use a portion of your memory as a RAM disk. A RAM disk is a portion of memory that is set up to act like a very fast disk drive for DOS commands and programs. A RAM disk is assigned a drive letter, just like a real disk. You can read and write files using a RAM disk, just like a real disk.

Because access to a RAM disk can be 20 times faster than a hard disk, a RAM disk can speed up some operations significantly. Data stored on a RAM disk is temporary, however. When you turn off your computer or reboot, you lose everything in the RAM disk.

A RAM disk can be stored in conventional, expanded, or extended memory. Conventional memory is best reserved for applications. If you have expanded memory, you may need it for one or more applications. The best place for a RAM disk is extended memory.

The syntax to create a RAM disk with the RAMDrive driver is

DEVICE = C:\DOS\RAMDRIVE.SYS *nnnn* /e

or

DEVICEHIGH = C:\DOS\RAMDRIVE.SYS *nnnn* /e

where *nnnn* is the size of the RAMDrive in bytes (1024 creates a one megabyte RAMDrive). You place the command goes in your CONFIG.SYS file after HIMEM.SYS. The /e means to use extended memory. Use /a to store the RAMDrive in expanded memory.

DOS assigns the RAMDrive the next available drive letter. If your hard disk is drive C, the RAMDrive is drive D.

Many programs need a place to store temporary files. These temporary files may be written and read many times while the program operates. If you tell the program to store these temporary files in a RAM disk, the program will run much faster.

These programs often look for the TEMP parameter in the DOS environment to tell it where to store temporary files. The DOS environment is like a bulletin board that any program can read to get information. You can store information in the environment with the SET command. If the RAMDrive is drive D, the SET command is

SET TEMP = D:\

To find out how big your RAMDrive must be to hold all the temporary files for an application, check the documentation for the application.

If you read and write some files frequently or execute some programs frequently, you can speed up processing if you copy these files to a RAMDrive.

Lessons Learned

- You can partially recover a damaged file.
- A device is computer hardware other than the main unit, such as the keyboard, video display, or printer.
- COPY CON allows you to create a file directly from your keyboard, without using a text editor.

- The PRN device allows you to direct printing from your keyboard to the printer without using a word processing program or text editor.
- With DOSKEY, it is easy to recall previous DOS commands so you don't have to retype them.
- If you have a 386 or 486 computer, you can convert extended memory to expanded memory for application programs that can use it.
- If you have a 386 or 486 computer, you can load drivers and programs into high memory and make more conventional memory available to application programs.
- You can use part of the computer's memory to simulate a very fast disk drive.

13

14

Common Commands and Your PC

DOS Commands by Purpose

Use the following list to determine which command to use for a specific task. Then refer to the command reference that follows the list for details about the use and syntax of that command.

If You Want To...	*Use*
Back up a hard disk	BACKUP
Concatenate files	COPY
Change the current directory	CHDIR (CD)
Change the current disk drive	*d:*
Change the date	DATE
Change the name of a file	RENAME (REN)
Change the time	TIME
Clear the screen	CLS
Compare disks	DISKCOMP
Compare files	COMP (or FC in MS-DOS only)
Copy between devices	COPY, XCOPY
Copy disks	COPY, DISKCOPY, XCOPY
Display a text file on-screen	TYPE
Display batch file commands and text strings on-screen	ECHO
Display the amount of memory	CHKDSK
Display the contents of a file	TYPE
Display the date	DATE
Display the files on a disk	DIR, CHKDSK, TREE
Display the free space on a disk	CHKDSK, DIR
Display the subdirectories on a disk	TREE, CHKDSK
Display the time	TIME
Display the version of DOS	VER
Display the volume label	VOL, DIR, CHKDSK
Erase a character	← or Backspace
Fix a file	CHKDSK, RECOVER
Locate a string in a file	FIND

If You Want To...	*Use*
Make a new directory	MKDIR (MD)
Move a file	COPY
Pause the display	Ctrl-S, MORE
Place DOS on the disk	FORMAT /S, SYS
Pipe the output between programs	|
Prepare a new disk	FORMAT
Prepare the hard disk	DISK, FORMAT
Redirect the input of a program	<, |
Redirect the output of a program	>, >>, |
Remove a file	ERASE, DEL
Remove a directory	RMDIR (RD)
Restore backed-up hard disk files	RESTORE
Set alternative directories for programs	PATH
Set/change checks on file writing	VERIFY
Set/change the system prompt	PROMPT
Sort a file	SORT
Use a new device	DEVICE (CONFIG.SYS)

This chapter is a Command Reference, encompassing the most frequently used MS-DOS commands. Each command is presented in the same format:

- The command name appears first, followed by the notation

  ✳ Internal or External

  which indicates whether the command is built into MS-DOS (internal) or is disk-resident (external).
- The entry then explains the command's purpose and shows the syntax required to invoke the command.
- Next are step-by-step instructions for using the command.
- Last are cautions or tips about the command and a brief comment indicating the emphasis you should place on mastering the command.

External Commands

You recall that DOS's internal commands can be issued from any disk drive or directory. Issuing external commands is a bit more complex. To issue an external command, you have three alternatives:

- Change to the directory that holds the external command. External commands are best kept in a subdirectory containing all the other DOS files. On hard disks, the path is usually C:\DOS.
- Include the path name (disk drive, if necessary, and directory name) every time you issue the command. This technique quickly becomes tedious.
- Make your AUTOEXEC.BAT file contain a PATH statement that includes the subdirectory holding the DOS files; then DOS executes external commands when you issue them. Make sure that the directory holding the external command is included in your preceding PATH command.

If you issue a command and get a `Bad command or file name` message, you have not set the path with the PATH command or the command is not in the default directory on the logged disk drive. Remember the rule of currents for issuing commands:

- If you do not specify a disk drive name for the command, MS-DOS searches for the command on the current disk drive.
- If you do not specify a path, MS-DOS searches for the command in the current directory of the current drive (or the current directory of the specified disk drive).

A Note about Notation

In the command notation used in this chapter, *d:* is the name of the disk drive holding the file, and *path*\ is the directory path to the file. The *filename* is the root name of the file, and *.ext* is the file name extension.

If any part of this notation does not appear in the syntax for the command, do not include the omitted part in the command. For example, the notation *d:filename.ext* indicates that you do not include path names in the command.

Commands that use source and destination drive parameters use *sd:* for the source drive name and *dd:* for the destination (target) drive name. The *s* and *d* parameters also are used for some other commands.

APPEND

External

Use APPEND to:

Open data files from a specified directory as if the data files were in the current directory.

Start programs that are not in the current directory and not in the search directory specified by PATH.

Command Syntax

APPEND *d1:path1;d2:path2 ... /switches*

Follow These Steps

1. Type **APPEND** and press the **space bar** once. You may need to precede the command with a drive and path for APPEND.EXE because APPEND is an external command.
2. Type the first search path, including the drive.
3. To search a second drive and path, type a semicolon (;), then type the second drive and path. Repeat this step for additional search paths. An example search path is

   C:\DOS;C:\DATA\WORDS;C:\DATA\ACCOUNTS.
4. You can use any of the following switches:

   /E adds the APPEND path to the environment. Use this switch only the first time you use APPEND after starting the computer. Use this switch with no other parameters.

   /X:ON enables searching the appended directories for program files.

   /X:OFF disables searching the appended directories for program files.

   /PATH:ON enables searching the append path if a program with a specified path is not found.

   /PATH:OFF disables searching the append path if a program with a specified path is not found.
5. Press Enter.

To delete the search paths, type the command **APPEND;**.

Caution: Do not use APPEND to search for a program's data files if the program writes a new file when a data file is modified (as do most word processors). Use APPEND only if the program modifies an existing file (as do database programs).

14

ASSIGN

External

Use ASSIGN to:

Send the request for information from one drive to another drive.

Command Syntax

ASSIGN *d1:=d2: /STATUS*

Follow These Steps

1. Type **ASSIGN** and press the **space bar** once. You may need to precede the command with a drive and path for ASSIGN.COM because ASSIGN is an external command.
2. Type the name of the drive that you want to assign (for example **A:**). Type an equal sign **(=)**.
3. Type the drive to which you want to assign that drive (for example, **C:**).
4. Press ↵Enter.

The command ASSIGN A=C makes DOS read drive C when you specify drive A. Type **ASSIGN /STATUS** to view the current assignments. Type **ASSIGN** and press ↵Enter to cancel the assignments.

ATTRIB

External

Use ATTRIB to:

Display a file's attributes.

Change a file's attributes.

Command Syntax

ATTRIB *attribs d:path\filename.ext /S*

Follow These Steps

1. Type **ATTRIB** and press the **space bar** once. You may need to precede the command with a drive and path for ATTRIB.EXE because ATTRIB is an external command.
2. You can press the **space bar**, then type any of the following attributes:

   +R makes the file read-only.

   –R enables changing the file.

   +A makes the file appear as if it were new or changed by turning on the Archive attribute.

   –A turns off the archive attribute.

   +S makes the file a system file by turning on the System attribute.

   –S turns off the system attribute.

   +H hides the file.

   –H turns off the hide attribute.
3. Press the **space bar**, then type the file name of the file whose attribute you want to display or change. You can use the wild-card characters * and ? when you type the filename.
4. You also can use the following switch with the ATTRIB command:

   /S searches for files in subsequent directories.
5. Press ↵Enter.

BACKUP

External

Use BACKUP to:

Back up hard disk information to protect original programs and data in case of loss or damage.

Back up files created or altered since a specific date or since the last backup.

Copy long files that cannot be stored on one floppy disk.

Command Syntax

BACKUP *sd:spath\sfilename.ext dd: /switches*

Follow These Steps

1. Type **BACKUP** and press the **space bar** once. You may need to precede the command with a drive and path for BACKUP.COM because BACKUP is an external command.
2. Type the drive name (*sd:*) of the hard disk you want to back up (for example, **C:**). To back up a directory or an individual file, type the path, file name, and extension; then press the **space bar**. You can use wild-card characters (* and ?) to designate groups of files.
3. Type the name of the drive (*dd:*) that will receive the backup files. (For example, to back up on a floppy disk in drive A, type **A:**.)
4. You can use any of the following switches:

   /S backs up the subdirectories as well as the current directory. If you start at the root directory, DOS backs up all subdirectories.

   The following switches are used in incremental backups:

   /F:*size* formats the target floppy disk to the size you specify (360, 720, 1.44, 2.88).

   /L:*d:path\logfile.ext* records the names of the backed up files to the file *logfile.ext*, located in *d:path*\.

   /M backs up files modified since the last backup. Use the /A switch with the /M switch to avoid erasing unmodified files when restoring from the backup disks.

/A adds files to the files already on the backup disk.

/D:*mm-dd-yy* backs up files created or changed on or after the specified date.

/T:*hh:mm:ss* backs up files created or changed at or after the specified time.

5. Press ↵Enter.

Caution: As you back up your files, remember to number the backup floppy disks. If you need to use the RESTORE command to restore lost files, you use the disks in numeric order.

Backing up your hard drive reduces the chance of losing valuable information. You do not need to memorize every step, but you should be familiar with BACKUP's basic command and switches.

CHDIR or CD

✳ Internal

Use CHDIR or CD to:

Change the current directory.

Show the name of the current directory.

Command Syntax

CHDIR *d:path*

or

CD *d:path*

Follow These Steps

1. Type **CHDIR** or **CD**. CHDIR (CD) is an internal command that does not require a path.
2. Press the **space bar** once.
3. Type the drive name of the disk whose current directory you want to change (for example, **A:**, **B:**, **C:**, etc.) and the name of the

directory to which you want to change. If you don't specify a path, DOS displays the current path. Remember to use the backslash to separate the parts of the path.

4. Press ↵Enter.

CHDIR is very important and simple to use; it is one of the commands you need to navigate around your disk.

14 CHKDSK

External

Use CHKDSK to:

Check the directory of the disk for disk and memory status. CHKDSK can show the following:

- the number of files and directories on a disk.
- the bytes used and the space available on a disk.
- the presence of hidden files.
- whether a floppy disk is bootable.
- the total RAM and available RAM.
- whether files are fragmented (noncontiguous).

CHKDSK also can make minor repairs.

Command Syntax

CHKDSK *d:path\filename.ext /F/V*

Follow These Steps

1. Type **CHKDSK** and press the **space bar** once. You may need to precede the command with a drive and path (the optional d:path\ in the syntax), because CHKDSK is an external command.
2. To check a disk on another drive, type the drive name, followed by a colon (:), after CHKDSK. If your default drive is C, and you want to check drive B, type **CHKDSK B:**.

3. You can use CHKDSK to determine the noncontiguous areas in an individual file by entering the path, file name, and extension. The file name and extension can contain wild-card characters.
4. You can use either of the following switches:

   /F repairs errors (use with caution).

   /V (verbose) displays paths and file names.
5. Press ↵Enter.

Tip: CHKDSK informs you whether the files on your disk are contiguous. This command also reports errors it finds and can simulate the repair of errors. Using the /F switch with CHKDSK repairs the error, generally gathering fractured files and combining them in one special file in your root directory.

CHKDSK gives you more control of your computer. This simple command provides a quick analysis of your diskette and hard disks and should be used once a week. For analysis of memory, see the MEM command.

CLS

✳ Internal

Use CLS to:

Clear the screen whenever you are at the DOS prompt.

Command Syntax

CLS

Follow These Steps

1. Type **CLS**.
2. Press ↵Enter. After DOS clears all messages on-screen, the DOS prompt and cursor reappear in the upper left corner.

CLS provides an excellent way to give your batch files a professional look.

COMP

External

Use COMP to:

Compare two files to see whether they are the same.

14

Command Syntax

COMP *d1:path1\filename1.ext1 d2:path2\filename2.ext2 /switches*

Follow These Steps

1. Type **COMP** and press the **space bar** once. You may need to precede the command with a drive and path for COMP.COM because COMP is an external command.
2. Type the name of the first file you want to compare. You can include the drive and path of the file.
3. Type the name of the second file you want to compare. You can include the drive and path of the file.
4. You can use any of the following switches:

   /D displays any difference using decimal numbers (rather than the default hexadecimal numbers).

   /A displays differences using ASCII characters.

   /T displays the line number of any difference.

   /N=*number* compares the first *number* of lines in both files.

   /C performs a non-case sensitive comparison.
5. Press Enter.

After COMP finds 10 errors, the comparison discontinues. If you do not specify file names, COMP prompts you for the first and second files you want to compare.

COPY

Internal

Use COPY to:

Copy one or more files to another disk or directory, or copy a file to the same directory and change its name.

Transfer information between DOS system devices.

Send text to the printer.

Create ASCII text files and batch files.

Command Syntax

The most common syntax for the COPY command is

COPY *sd:\spath\sfilename.sext dd:\dpath\dfilename.dext /switches*

Follow These Steps

1. Type **COPY** and press the **space bar** once.
2. Type the drive name and path of the source file (*sd:\path*).
3. Type the name of the file you want to copy. You can use wild-card characters.
4. You can include the following switches for the source file:

   /A treats the source file as an ASCII text file.

   /B forces DOS to copy the entire file as though it were a program file (binary). Binary copying is the default.
5. Press the **space bar**.
6. Type the drive name, path, and file name of the target file (*dd:\path*). Skip this step if the file name is to remain the same as that of the source file.
7. You can include the following switches for the target file.

   /A places a Ctrl-Z (end-of-file character) at the end of the copied file.

   /B prevents a Ctrl-Z from being added to a copied file.
8. You also can add a /V switch to verify and check the accuracy of the COPY procedure.
9. Press ↵Enter.

Caution: COPY does exactly what you tell it to do. Before you use this command, make sure that you have planned well. When you copy to another directory or disk, COPY overwrites a file of the same name, so be sure to type the file names exactly (including directory names).

COPY is a very flexible command that you should know like the back of your hand.

14 DATE

✳ Internal

Use DATE to:

Enter or change the system date.

Set the internal clock on a computer with a battery-backed clock.

Ensure the current date-stamp for newly created and modified files.

Provide control for programs that require date information, such as BACKUP and RESTORE.

Command Syntax

DATE date_format

Follow These Steps

1. Type **DATE** and press the **space bar** once.
2. Enter the date in one of the following formats:
   mm-dd-yy (for North America; this format is the default)
   dd-mm-yy (for Europe)
   yy-mm-dd or *yyyy-mm-dd* (for East Asia)
   mm is a one- or two-digit number for the month (1 to 12).
   dd is a one- or two-digit number for the day (1 to 31).
   yy is a one- or two-digit number for the year (80 to 99). DOS assumes the first two digits of the year are "19."
   yyyy is a four-digit number for the year (1980 to 2099).
   You can separate the entries with hyphens, periods, or slashes.
3. Press ↵Enter.

If your PC doesn't have a built in calendar clock, use this command every time you boot. Knowing when files were written or updated is good organizational strategy and aids you in being selective with BACKUP and XCOPY. Better still, cards containing battery-operated calendar clocks have become very inexpensive; you can purchase such a clock to eliminate typing the time and date every time you start your computer.

DEVICE

✳ Internal

Use DEVICE to:

Support add-on peripherals.
Install a block-device driver.
Install a virtual (RAM) Disk.

Command Syntax

DEVICE= *d:path*\devicedriver

Follow These Steps

1. Using a text editor, open your CONFIG.SYS file. If you do not have a CONFIG.SYS file, create one with COPY CON or with a text editor.
2. Type on one line in your CONFIG.SYS file the command **DEVICE=** *d:path*\device driver.
3. Repeat Step 2 until all desired device drivers are included in your CONFIG.SYS file.
4. Restart your system.

Note: Device drivers usually come with hardware you purchase. Check installation instructions for your device and driver.

Sooner or later, you will add the DEVICE command to your CONFIG.SYS file. If you include the proper DEVICE commands, the command(s) are issued every time you boot. The most commonly used device driver is ANSI.SYS. This device driver provides additional control over your display and keyboard. If ANSI.SYS resides in C:\DOS, include the command DEVICE=C:\DOS\ANSI.SYS in your CONFIG.SYS file.

DIR

Internal

Use DIR to:

Display a list of files and subdirectories in a disk's directory.
List a specified group of files within a directory.
Examine the volume identification label of the disk.
Determine the amount of available space on the disk.
Check the size of individual files.
Check the date the files were last modified.

Command Syntax

DIR *d:\path\filename.ext /switches*

Follow These Steps

1. Type **DIR** and press the **space bar** once.
2. You also can type one of the following:

   The drive name whose directory you want to display.

   The path name whose directory you want to display.

   The file name, if you want to limit the number and types of files to be listed.

   You can use wild-card characters to list groups of files.
3. You can use any of the following switches:

   /W displays the directory in a wide format of five columns across. The /W switch displays the directory name and file names only. For large listings, you also can include the /P switch.

   /P displays the directory and pauses between screen pages. This switch prevents large directories from scrolling off the screen before you can read them.

   /A:*attrib* displays those files that have certain attributes on or off. The attributes are as follows:

Attrib	*Displays*
(/A only)	All files, including system and hidden.
H	Hidden files.
S	System files.
D	Subdirectories.
A	New or modified files.
R	Read-only files.
-attrib	The attribute is off.

/O:*sort* displays files in sorted order.

Sort	*Display Order*
N	Alphabetic order by file name.
E	Alphabetic order by extension.
D	Date and time order.
S	Size order.
G	Directories before file names.
-sort	From greatest to least.

/S searches through subdirectories for files to display.

/B displays file names in the format *FILENAME.EXT*.

/L displays all file names and extensions in lower case.

4. Press ↵Enter.

DISKCOMP

External

Use DISKCOMP to

Compare two diskettes on a track-for-track, sector-for-sector basis to see whether their contents are identical.

Verify the integrity of a DISKCOPY operation.

Command Syntax

DISKCOMP *sd: dd: /1 /8*

Follow These Steps

1. Type **DISKCOMP** and press the **space bar** once.
2. Type the name of the drive that holds the source diskette (for example, type **A:**) and press the **space bar** again.
3. Type the name of the drive that holds the target diskette (for example, **B:**). If you have only one diskette drive, type **A:** again.
4. You can use either of the following switches:

   /1 compares a single-sided diskette only.

   /8 compares an eight-sectored diskette only.
5. Press ↵Enter. DOS instructs you to place the source diskette into drive A and the target diskette into drive B. If you have only one diskette drive, DOS instructs you to place the source disk into drive A.
6. Insert the diskettes requested and press ↵Enter again. DISKCOMP compares all tracks and issues any necessary error messages, indicating the track number and side of the diskette on which errors occur. If you have only one disk drive, DOS then instructs you to exchange the source diskette with the target diskette. When DISKCOMP is finished, you are asked whether you want to compare more disks.
7. Press **Y** or **N**. If you press **Y**, repeat steps 5, 6, and 7.

Tip: You may never use this command because you can also use the /V switch to verify as you use DISKCOPY.

DISKCOPY

External

Use DISKCOPY to:

Secure data against loss by duplicating a floppy disk. Note that DISKCOPY works only when copying floppy disks of the same size and capacity.

Command Syntax

DISKCOPY *sd: dd: /1 /V*

Follow These Steps

1. Type **DISKCOPY** and press the **space bar** once.
2. Type the name of the drive that holds the source diskette (**A:**, for example). Press the **space bar** again.
3. Type the name of the drive that holds the target diskette (**B:**, for example).
4. You can use either of the following switches:

   /1 copies one side of the diskette only (use with single-sided diskettes only).

   /V verifies that the copy was performed correctly.
5. Press ↵Enter. Within a few seconds, DOS prompts you to place the source diskette into drive A and the target diskette into drive B. If you have only one diskette drive, DOS prompts you to place the source disk in drive A.
6. Insert the diskettes requested and press ↵Enter. If you have only one diskette drive, DOS prompts you to exchange the source disk with the target disk.
7. When the copy is complete, DOS asks whether you want to copy another diskette.
8. Press **Y** or **N**. If you press **Y**, repeat Steps 6, 7, and 8.

Tip: DISKCOPY is for duplicating diskettes, not hard disks. If a problem exists on the original (source) diskette, the same problem will appear on the duplicate diskette.

DISKCOPY is one of the basic commands that you need to understand completely.

DOSKEY

External

Use DOSKEY to:

Recall commands typed from the command line.

Edit the command line to change previous commands.

Create custom commands.

Command Syntax

To start DOSKEY:

DOSKEY */REINSTALL /BUFSIZE=size /INSERT /OVERSTRIKE*

To view macros and the history of commands:

DOSKEY /MACROS /HISTORY

To create a macro:

DOSKEY macroname=commands

When starting DOSKEY, you can specify how many bytes of memory DOSKEY uses to store macros and commands. The default is 512 bytes, but you can specify as little as 256 bytes.

DOSSHELL

External

Use DOSSHELL to:

Perform DOS commands from menus.

Manage files and directories.

Manage and start programs.

Command Syntax

DOSSHELL */T:res /G:res /B*

Follow These Steps

1. Type **DOSSHELL**. You may need to precede the command with a drive and path for DOSSHELL.COM because DOSSHELL is an external command.
2. You can use any of the following switches:

   /T:*res* changes to a text display (*res* can be L, M, M1, M2, H, H1 or H2).

   /G:*res* changes to a graphical display (*res* can be L, M, M1, M2, H, H1 or H2).

   /B displays the DOS Shell in black and white rather than in color.
3. Press ↵Enter.

Use the /T, /G or /B switches to change the screen resolution only when you start the DOS Shell. Generally, you do not need to use the /T, /G or /B switches because the DOS Shell remembers the screen resolution that you last used.

ECHO

✳ Internal

Use ECHO to:

Display batch-file commands and text strings on-screen.

Control video output to the screen.

Debug batch files.

Command Syntax

To turn off the display of commands when you run batch files:

```
ECHO OFF
```

To turn on the display of commands:

```
ECHO ON
```

To display a message:

```
ECHO message
```

To display a blank line:

ECHO.

Notice that the period is directly after ECHO with no space.

ECHO is an excellent batch-file creation utility. If you understand its use, you can have fun personalizing your PC's operation.

14 EDIT

External

Use EDIT to:

Create or modify text files such as a batch file or the CONFIG.SYS file.

Command Syntax

EDIT *d:path\filename.ext /B /G /H /NOHI*

Follow These Steps

1. Type **EDIT** and press the **space bar** once. You may need to precede the command with a drive and path for EDIT.COM because EDIT is an external command.
2. Type the name of the file you want to edit, including the drive and path of the file (if the file is not in the current directory).
3. You can use any of the following switches:

   /B makes EDIT display in black and white rather than in color.

   /G makes a CGA monitor update faster.

   /H makes EDIT display in the maximum resolution of your video display.

   /NOHI makes EDIT display in eight colors rather than the usual 16 colors.
4. Press ↵Enter.

ERASE or DEL

✳ Internal

Use ERASE or DEL to:

Remove one or more files from the directory.

Command Syntax

ERASE *d:path\filename.ext /P*

or

DEL *d:path\filename.ext /P*

Follow These Steps

1. Type **ERASE** or **DEL** and press the **space bar** once.
2. Type the drive name and path of the file you want to delete, unless the file is in the current directory.
3. Type the name of the file you want to delete.
4. You can use the following switch:

   /P prompts *filename* `Delete (Y/N)?` before each file is deleted. Press **Y** to delete or **N** to skip the file.
5. Press ↵Enter.

Caution: ERASE (DEL) is a deceptively simple command that can make your life easy or fill it with grief. Practice using this command and think carefully before pressing the ↵Enter key. Be very careful when you use wild-card characters, or you may delete more files than you intend. You may prefer to use /P. To enable you to recover an accidentally deleted file, see MIRROR and UNDELETE.

FASTOPEN

External

Use FASTOPEN to:

Remember the location of often-used files so they can be located quickly.

Command Syntax

FASTOPEN *drive1:=files1 drive2:=files2 ... /X*

Follow These Steps

1. Type **FASTOPEN** and press the **space bar** once. You may need to precede the command with a drive and path for FASTOPEN.EXE because FASTOPEN is an external command.
2. Type the first letter of the drive to remember file locations (for example, **A:**). Press **=**.
3. Type the number of files you want DOS to remember (**40**, for example, if you want DOS to remember the location of the last 40 files opened).
4. You can use the following switch:

   /X places the storage area of often-used files in expanded memory.
5. Press ↵Enter.

If you use a program that opens the same files over and over again, such as a word processor or database, then FASTOPEN can speed up your program. If you use a program that reads files one at a time, such as a spreadsheet program, then you get no benefit from the FASTOPEN command.

FC

External

Use FC to:

Compare two files to see whether they are the same.

Command Syntax

FC */switches* d1:path1\filename1.ext1 d2:path2\filename2.ext2

Follow These Steps

1. Type **FC** and press the **space bar** once. You may need to precede the command with a drive and path for FC.EXE because FC is an external command.
2. You can use any of the following switches:

/A displays the first and last lines of the section of a file that is different rather than displaying the entire different section of the file.

/B specifies that the files you are comparing are binary or program files, rather than text or ASCII files.

/C specifies a non-case sensitive comparison.

/L specifies that the files you are comparing are text or ASCII files, rather than binary or program files.

/LB*n* changes the internal buffer for *n* number of lines you want to compare in a file.

/N displays the line numbers of the differing lines when comparing text or ASCII files.

/T does not change an ASCII file's tabs to spaces for comparison.

/W condenses contiguous spaces and tabs into a single space during the comparison.

/xxxx tells FC how many consecutive lines must compare as equal before FC considers the two files to be back in sync after mismatches. *xxxx* is a number (the default is 2).

3. Type the name of the first file you want to compare. If the first file you want to compare is not in the current directory, then precede the file name with the drive and path of the file. You can use the wild-card characters * and ? in the file name.
4. Type the name of the second file you want to compare. If the second file you want to compare is not in the current directory, then precede the file name with the drive and path of the file. You can use the wild-card characters * and ? in the file name.
5. Press ↵Enter.

FC is similar to COMP, but you can customize FC more.

FIND

External

Use FIND to:

Display lines that contain, or fail to contain, a certain group of characters. These characters are called a string.

Command Syntax

FIND */C/N/V/I "string" d:path\filename.ext...*

Note that switches for FIND are placed in the middle of the command line, before the search string is specified.

Follow These Steps

1. Type **FIND** and press the **space bar**. You may need to precede the command with a drive and path if FIND is not in the root directory or in a path governed by the PATH command.
2. You can use any of the following switches:

   /C counts the number of lines that contain the search string.

   /N displays the line number of each line that contains the search string.

   /V displays all lines that do not contain the search string.

   /I performs a non-case-sensitive search.

3. Type the string, enclosed in quotation marks (*"string"*). The string is the character set you want to find. FIND is case-sensitive; if you want to find uppercase characters, for example, type the *"STRING"* in uppercase letters.
4. If the file is not in the current directory, type the drive name and path of the file being searched.
5. Type the file name and extension of the file you want to search.
6. Press the **space bar** and repeat Steps 4 and 5 for each file you want FIND to search. You cannot use wild-card characters (? or *).
7. Press ↵Enter.

FIND is a very convenient command, becoming particularly important as your hard drive fills with files and subdirectories.

FORMAT

External

Use FORMAT to:

Initialize a floppy disk or hard disk to accept DOS information and files.

Command Syntax

FORMAT *d: /S /1 /8 /V /B /4 N:xx T:xx /F:size /Q /U*

Follow These Steps

1. Type **FORMAT**.
2. Press the **space bar** once.
3. Type the name of the drive holding the disk you want to format (for example, **B:**).
4. You can use any of the following switches:

   /V gives the formatted disk a unique, identifying volume label.

   /S produces a bootable disk with the DOS operating system on the formatted disk.

/4 formats (on a high-capacity drive) a single- or double-sided diskette for use in computers that use double-density disks.

/1 formats a diskette on one side. Use this switch to format diskettes for older PCs and compatibles.

/8 formats a diskette with eight sectors per track rather than the default value of nine sectors per track. Use this switch to format disks for older PCs and compatibles.

/B creates an eight-sector diskette that reserves space for the operating system.

/N:*xx* formats a disk with a different number of sectors than the default value. *xx* represents the number of sectors. Always use this switch with the /T:*xx* switch.

/T:*xx* formats a disk with a different number of tracks than the default value. *xx* represents the number of tracks. Use this switch with the /N:*xx* switch.

/F:*size* formats a diskette to a specific capacity (360, 720, 1.44, 2.88).

/Q performs a quick format on an already formatted disk.

/U performs an unconditional (nonsafe) format.

5. Press ↵Enter.
6. DOS now instructs you to place a diskette into the drive you named in Step 3. Insert the diskette you want to format and press ↵Enter.
7. In a few minutes, you see the message `Format complete` and a status report of the formatted diskette.
8. If you selected the /V switch, DOS asks you to enter the volume label, a name of up to 11 characters. Type the volume label and press ↵Enter.
9. DOS then asks whether you want to format another disk.
10. Press Y and repeat Steps 6 through 9 to format another disk; otherwise, press N.

Caution: If you format a 360K diskette in a 1.2M disk drive, it might not be readable in a 360K drive. Also, a 1.2 M disk might look exactly like a 360K diskette, but the higher density 1.2M diskette cannot be used in a 360K disk drive.

FORMAT is an absolute must to understand. This command is the heart of your disk-maintenance system. If you accidentally format an already formatted disk, you may be able to recover the information using the UNFORMAT command.

HELP

External

Use HELP to:

Display syntax help for a command on the screen.

Command Syntax

HELP command

Follow These Steps

1. Type **HELP** and press the **space bar** once. You may need to precede the command with a drive and path for HELP.EXE because HELP is an external command.
2. Type the command for which you want to get help (for example, **FORMAT**).
3. Press ↵Enter.

JOIN

External

Use JOIN to:

Attach a second drive to a subdirectory of a first drive.

Command Syntax

To join two drives:

JOIN *guestdrive: hostdrive:hostdirectory*

To break two joined drives:

JOIN *guestdrive: /D*

To display all currently assigned joins:

JOIN

The subdirectory of the host drive must be empty. If the subdirectory of the host drive does not exist, JOIN creates the directory.

LABEL

14

External

Use LABEL to:

Change or remove the electronic label stored on a disk.

Command Syntax

LABEL *d:label*

Follow These Steps

1. Type **LABEL** and press the **space bar** once. You may need to precede the command with a drive and path for LABEL.EXE because LABEL is an external command.
2. Type the drive for which you want to change the label, if that drive is not the current drive.
3. Type the new label. If you do not type a label on the command line, DOS will prompt you for a label.

MEM

External

Use MEM to:

Display the current status of memory.

Display programs that are loaded into memory.

Command Syntax

MEM */PROGRAM /DEBUG /CLASSIFY*

Follow These Steps

1. Type **MEM** and press the **space bar** once. You may need to precede the command with a drive and path for MEM.EXE because MEM is an external command.
2. You can use any of the following switches:

   /PROGRAM displays programs loaded into memory with each program's size and address location.

   /DEBUG displays programs and internal drivers loaded in memory with the size and address if necessary. Also displays other programming information.

   /CLASSIFY displays programs loaded in memory, specifying whether they are in conventional memory or upper memory. Displays the size of each program with decimal and hexadecimal values.
3. Press Enter.

MIRROR

External

Use MIRROR to:

Save important disk information to enable you to recover from an accidental format.

Remember deleted files so that you can recover a deleted file.

Store a hard disk's partition information to recover from a lost disk partition.

Command Syntax

To save information about a disk to recover from a format:

MIRROR *drive1: drive2: ...*

To keep track of deleted files:

MIRROR */Tdrive1-files1 /Tdrive2-files2 ...*

To save a hard disk's partition information:

MIRROR */PARTN*

For example, to install MIRROR to keep track of as many as 50 files on drive C and 50 files on drive D, type this command:

MIRROR /TC-50 /TD-50

MKDIR or MD

✳ Internal

Use MKDIR to:

Create subdirectories to help organize your files.

Command Syntax

MKDIR *d:directory name*

or

MD *d:directory name*

Follow These Steps

1. Type **MKDIR** and press the **space bar** once.
2. You also can type the drive name and path of the new directory.
3. Type the directory name.
4. Press ↵Enter.

If you have a hard disk drive, you need to understand this command. MKDIR (MD) creates the "book shelves" for categorizing your files.

MORE

External

Use MORE to:

Display data one screen at a time.

Command Syntax

d:path\filename.ext | MORE

Follow These Steps

1. Type the name of the file you want to display in groups of 23 lines and press the **space bar** once. You may need to precede the syntax with a program name that acts on the file name (for example, **TYPE** ***filename.ext***).
2. Type **|** (the pipe symbol) and press the **space bar**.
3. Type **MORE** and press Enter.

   Video output pauses between pages, and DOS displays the `-More-` message.
4. Press any key to display the next 23 lines of data.

MORE is very convenient for reading files longer than one screen.

PATH

Internal

Use PATH to:

Access files not in the default directory without changing directories. PATH tells DOS to search specified directories on specified drives if it does not find a program or batch file in the current directory.

Command Syntax

PATH *d1:\path1;d2:\path2;d3:\path3;...*

Follow These Steps

1. Type **PATH** and press the **space bar** once.
2. Type the drive name you want to include in the search path (for example, **A:**, **B:**, or **C:**). If you include the drive name with the path, DOS finds your files even if you change default drives.
3. Type the directory path you want to search (for example, **\KEEP**).
4. To add another directory to the search path, type a semicolon (**;**), then the drive name and path of the additional directory .
5. Repeat Steps 2 through 4 until you type all the subdirectory paths you want DOS to search.
6. Press ↵Enter.

PATH is an important navigational aid that you need to understand fully. If you don't understand PATH, you don't understand the directory concept.

PROMPT

✳ Internal

Use PROMPT to:

Customize the DOS system prompt.
Display the drive and directory path.
Display a message on the computer.
Display the date and time or the DOS version number.

Command Syntax

PROMPT *promptstring*

Follow These Steps

1. Type **PROMPT** and press the **space bar** once.
2. Type the text string and the arrangement of parameters you want to display.
3. You can use the meta-string characters, preceded by **$**, with the PROMPT command to produce your own DOS prompt:

Characters	*Prompt*
D	The current date.
G	The > character.
L	The < character.
N	The current disk drive name.
P	The current drive and path.
Q	The = character.
T	The system time.
V	The DOS version.
Any other	The character is ignored.

After you place PROMPT in your AUTOEXEC.BAT with the desired information, you may never refer to the PROMPT command again. PROMPT is used most frequently to extend the visual command line to display the path of your resident directory.

REN

✳ Internal

Use RENAME to:

Change the name of a file or group of files.

Command Syntax

RENAME *d:path\oldfilename.ext newfilename.ext*

Follow These Steps

1. Type **RENAME** or **REN** and press the **space bar** once.
2. Type the drive name and path of the file you want to rename.
3. Type the file name of the file you want to rename. You can use wild-card characters (* and ?) to specify groups of files.
4. Press the **space bar**.
5. Type the new name you want to assign the file and press ↵Enter.

Caution: Avoid giving files in different directories the same file name. You might accidentally delete the wrong file by mistake.

Practice this command. It has a million-and-one uses.

REPLACE

External

Use REPLACE to:

Replace files on a destination disk with the files of the same name from the source disk.

Copy files from the source disk that do not already exist on the destination disk.

Replace files on the destination disk with files from the source disk only if the source files have a later date than the destination files.

Command Syntax

REPLACE *sd:spath\filename.ext dd:dpath\ /switches*

Follow These Steps

1. Type **REPLACE** and press the **space bar** once. You may need to precede the command with a drive and path for REPLACE.EXE because REPLACE is an external command.
2. Type the drive name and path of the source file (*sd:\spath*).

3. Type the name of the file you want to copy. You can use wild-card characters.
4. Press the **space bar**.
5. Type the drive name and path of the target location (*dd:\dpath*).
6. You can use any of the following switches:

   /A copies files from the source disk that do not already exist in the destination directory.

   /R replaces files on the destination disk even if the files have the read-only attribute set on.

   /U replaces files on the destination disk that are older than the files on the source disk.

   /P prompts you before copying each file.

   /S copies specified files from the current directory and from subdirectories of the current directory.

   /W makes REPLACE wait before starting the copy so that you can insert the correct disks in the drive.
7. Press **Enter**.

RESTORE

External

Use RESTORE to:

Retrieve one or more files from a backup disk and store on another disk (usually a hard disk).

Command Syntax

RESTORE *sd: dd:\dpath\dfilename.ext /switches*

Follow These Steps

1. Type **RESTORE** and press the **space bar** once.
2. Type the name of the source drive that contains the backed up files. (For example, to restore files from drive A, type **A:**.) Press the **space bar**.

3. Type the name of the destination drive. (For example, to restore files to a hard disk in drive C, type C:.) If you omit the drive name, the default drive becomes the destination drive.
4. To restore files from only one directory type the path (directory name).
5. Type the name and extension of the file or files you want to restore. You can use wild-card characters to designate a group of files. (For example, type *.* to restore all files on a disk or subdirectory.)
6. You can use any of the following switches:

   /S restores all files in the current directory and subdirectories of the current directory, creating subdirectories when necessary.

   /P displays a screen prompt that asks whether you want to restore files that changed since the last backup or are designated by the ATTRIB command as read-only.

   /M restores only those files modified or deleted since the last backup.

   /N restores only those files that no longer exist on the target disk.

   /B:*mm-dd-yy* restores only those files modified on or before the specified date.

   /A:*mm-dd-yy* restores only those files modified on or after the specified date.

   /L:*hh:mm:ss* restores only those files that have changed at or later than the specified time.

   /E:*hh:mm:ss* restores only those files that have changed at or earlier than the specified time.

   /D displays the names of the files to be restored without actually restoring the files.
7. Press ↵Enter. At the prompt, place a backup disk into the source drive and press ↵Enter again.
8. Repeat Step 7 until all the backup disks are processed.

Tip: Remember, store your numbered disks in order. The RESTORE operation can be crucial, and you do not want to create unnecessary complications in the middle of this procedure.

RESTORE is the flip-side of the coin for BACKUP. You need to understand both equally well.

RMDIR or RD

Internal

Use RMDIR to:

Remove a directory.

Command Syntax

RMDIR *d:path*

or

RD *d:path*

Follow These Steps

1. Use the ERASE command to delete any files from the directory you want to remove. The directory can contain only the current (.) and parent (..) files.
2. Type **RMDIR** or **RD** and press the **space bar** once.
3. Type the drive name of the directory you want to remove.
4. Type the full path and name of the subdirectory you want to remove.
5. Press ↵Enter.

REMOVE is another essential command for maintaining a logical hard disk drive subdirectory system.

SORT

External

Use SORT to:

Read input data, sort it, and write it to an output device.

Sort and list directory information.

Display, arrange, and sort data alphabetically in ascending or descending order.

Command Syntax

SORT */R* */+n*

Follow These Steps

1. Type **SORT** and press the **space bar** once.
2. You can use either of the following switches:

   /R sorts in reverse alphabetical order.

   /+*n* sorts in alphabetical order, starting at column *n*.
3. Press Enter.

Example: SORT /R <PRESORT.TXT >POSTSORT.TXT
SORT sorts, in reverse alphabetical order, the contents of the file PRESORT.TXT and writes the sorted contents to the file POSTSORT.TXT.

SORT is not an essential command, but is one of the niceties used for visual control.

SYS

External

Use SYS to:

Transfer the operating system files to another disk. SYS enables the transfer of operating system files to a disk that holds an applications program if the disk has enough space.

Command Syntax

SYS *sd: dd:*

Follow These Steps

1. Place the target disk (the disk to receive the operating system) into a disk drive.
2. Type **SYS**.

3. Press the **space bar** once.
4. If the operating system you want to copy is on a disk other than the disk you booted from, type the name of the drive containing the operating system, (for example, **A:**).
5. Type the name of the drive holding the target disk (for example, **B:**).
6. Press ↵Enter. SYS transfers the operating system, including COMMAND.COM, to the floppy disk in the target drive.

Tip: You do not need to transfer the operating system to every floppy disk. Save disk storage space by transferring the operating system only to disks you want to use as boot disks.

In earlier versions of DOS, SYS was used to transfer the hidden system files without copying COMMAND.COM. DOS 5's SYS command transfers COMMAND.COM as well as the hidden system files.

TIME

✳ Internal

Use TIME to:

Enter or change the time used by the system.

Set the automatic clock on a computer with a battery-backed clock.

Establish the time that files were created or modified.

Provide control for programs that require time information, such as BACKUP and RESTORE.

Command Syntax

TIME *hh:mm:ss.xx A|P*

Follow These Steps

1. Type **TIME** and press the **space bar** once.
2. Enter the time in the format *hh:mm:ss* or *hh.mm.ss*. For *hh*, type the hour from 0 to 23 hours using one or two digits. For *mm*, type the

number of minutes from 0 to 59 using one or two digits. For *ss*, type the number of seconds from 0 to 59 using one or two digits.

3. To show hundredths of a second, press the period (.) and enter one or two digits from 0 to 99.
4. If you enter the time using the 12 hour clock, type **A** to represent AM hours or **P** to represent PM hours. (For example, enter 3:13 PM as 15:13 or 3:13P.)
5. Press Enter.

Use TIME with the DATE command. Including the correct time in a file may not be as important as including the date, but don't get into poor management habits. Better still, think about getting a battery-powered clock card for your PC to save time.

TREE

External

Use TREE to:

Display directory paths in hierarchical directories.
List the available files in each directory.
Find lost files within a maze of directories.

Command Syntax

TREE *d: /F/A*

Follow These Steps

1. Type **TREE** and press the **space bar** once.
2. Type the name of the drive whose directory paths you want to display. The TREE command lists information about this drive.
3. You can use either of the following switches:

   /F lists the files in each directory.

   /A uses the characters |, -, \ and + to display the subdirectory structure (rather than using graphic line characters).
4. Press Enter.

The TREE command is another way to monitor a hard disk drive's directory structure. As time goes on, you appreciate it more.

TYPE

Internal

Use TYPE to:

Display the contents of a text file on the screen.

Send files to the printer.

Command Syntax

TYPE *d:path*\filename.ext

Follow These Steps

1. Type **TYPE** and press the **space bar** once.
2. Type the drive name, path, and file name of the file you want to display.
3. Press ↵Enter.

Note: Use the redirection symbol > to send the typed output to a device such as the printer (PRN).

Example: TYPE TEXT.TXT > PRN

TYPE enables you to read a file without putting it into a word processor.

UNDELETE

External

Use UNDELETE to:

List files that have been deleted but can be undeleted.

Undelete files by using a file created by MIRROR or by searching through DOS's directory.

Command Syntax

To list deleted files:

UNDELETE *d:path\filename.ext /LIST*

To undelete a file:

UNDELETE *d:path\filename.ext /DT*

or

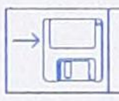
UNDELETE *d:path\filename.ext /DOS*

To undelete all files in a directory:

UNDELETE *d:path\filename.ext /ALL*

When specifying a filename, you can use the wild-card characters * and ?. The switch /DT tells UNDELETE to use a delete tracking file created by MIRROR. The switch /DOS tells UNDELETE to ignore the delete tracking file and use the DOS directory. UNDELETE normally prompts with (Y/N) when undeleting files; however, the /ALL switch tells UNDELETE to undelete files without asking.

UNFORMAT



Use UNFORMAT to:

Rebuild a disk that has been formatted.

Rebuild a disk that has been corrupted by using the RECOVER command incorrectly.

Restore the partition information to a disk that has lost its partition.

Command Syntax

To test UNFORMAT to determine the outcome without actually performing UNFORMAT, and optionally to send the output to the printer:

UNFORMAT *d: /TEST*

To compare the mirror file with the disk, and optionally to send the output to the printer:

UNFORMAT *d: /J /P*

To unformat a disk:

UNFORMAT *drive: /U /P*

To restore a partition to a hard disk:

UNFORMAT */PARTN /L*

Before unformatting a disk, use the /TEST switch to determine the outcome of UNFORMAT. The /P switch is an option you can use to send messages from UNFORMAT to the printer for a printed record of this procedure. If you use the /U switch, UNFORMAT rebuilds the disk without using a MIRROR file. Use this only if you find, after using the /TEST switch, that the MIRROR file is old and may not contain up-to-date information.

VER

✳ Internal

Use VER to:

Display the DOS version number.

Command Syntax

VER

Follow These Steps

1. Type **VER**
2. Press ↵Enter. DOS displays the version number on-screen along with a message like the following:

   ```
   MS-DOS Version 5.00
   ```

The result of VER is pretty to look at, but infrequently used. This command is singularly limited in purpose.

VERIFY

Internal

Use VERIFY to:

Set your computer to check the accuracy of data written to a disk.
Show whether the data has been checked.

Command Syntax

To show whether VERIFY is on or off:

```
VERIFY
```

To set the verify status:

```
VERIFY ON
```

or

```
VERIFY OFF
```

Follow These Steps

1. Type **VERIFY** and press the **space bar** once.
2. Type **ON** or **OFF** depending on whether you want **VERIFY** on to check for accuracy or off for fast disk-writing operation.

VERIFY provides absolute peace of mind, but requires twice as long to copy files. Many people are in the habit of using verification. If you have the time, it just might be worthwhile.

VOL

Internal

Use VOL to:

Display the volume label of the specified drive.

Command Syntax

VOL *d:*

Follow These Steps

1. Type **VOL** and press the **space bar** once.
2. Before you press ↵Enter, type the drive name of the disk whose volume name you want to examine (for example, **A:**, **B:**, etc.), if that drive is not current.
3. Press ↵Enter.

Some people never use this feature, but (in fact) VOL is as important as labeling a disk.

XCOPY

External

Use XCOPY to:

Copy files from multiple directories to another disk.

Copy files with a specific date.

Copy newly created or modified files.

Copy subdirectories and files.

Command Syntax

XCOPY *sd:spath\sfilename.sext dd:dpath\dfilename.dext*

Follow These Steps

1. Type **XCOPY** and press the **space bar** once. You may need to precede the command with a drive and path for XCOPY.EXE because XCOPY is an external command.
2. Type the drive name and path of the source file (*sd:\path*).
3. Type the name of the file you want to copy. You can use wild-card characters.

4. Press the **space bar**.
5. Type the drive name, path, and file name of the target file (*dd:\path*). Skip this step if the file name is to remain the same as that of the source file.
6. You can use any of the following switches:

   /A copies files with the archive attribute set on and does not change the archive attribute.

   /M copies files with the archive attribute set on, then shuts off the archive attribute.

   /D:*date* copies files that were created or modified on or after the date.

   /P prompts you before copying each file.

   /S copies specified files from the current directory and from subdirectories of the current directory, creating directories on the destination disk when necessary.

   /E copies empty subdirectories.

   /V verifies each copied file.

   /W makes XCOPY wait before starting the copy so that you can insert the correct disks in the drive.
7. Press ↵Enter.

15

Errors Great and Small

Recognizing error messages

Assessing the importance of error messages

Interpreting error messages

Correcting error messages

One of the standard routines of slapstick humor involves slipping on a banana peel.

What makes this funny? Certainly not the fall. Everyone falls at one time or another, often with unpleasant results. Maybe the humor in slapstick is possible because no one really gets hurt; you know that the actors don't injure themselves, so you can sit back and enjoy the physical levity.

Before you finish this chapter, you will realize that although some of the DOS error messages are no laughing matter, you probably will never see *those* error messages appear on your screen. In fact, most of the common error messages allow you to smile at mistakes you can correct easily.

What are Error Messages?

Ending a book with a chapter on errors may make you wince, but don't lose heart. You can treat most of the common DOS error messages with a grin. Error messages are DOS's way of telling you that you (or DOS) made a correctable blunder. Error messages serve as reminders that both man and machine make mistakes.

Occasionally, you may issue a harmless but incorrect command or forget to close the door on a disk drive. DOS quickly points out such frailties, but you can correct and learn from these mistakes.

How Serious Are Error Messages?

Some error messages indicate a serious problem. Fortunately, you probably will never see one of those messages. Also, some potentially serious error messages can be caused by any of several problems; if you remain calm, you might discover an easy remedy.

Meanwhile, read through the following error messages. These messages are the ones that routinely appear on your screen. Disasters are rare, so enjoy your PC, confident that you have earned your wings.

Interpreting Error Messages

If you see a message that you cannot locate in this guide, refer to your computer's MS-DOS manual.

Some messages appear when you start MS-DOS, and some appear while you use your computer. Most start-up errors mean that MS-DOS did not start and that you must reboot the system. Most of the other error messages mean that MS-DOS terminated (aborted) the program and returned to the system prompt. For easy reference, the messages are listed in alphabetical order with explanations of their most common causes.

Access denied

You or a program attempted to change or erase a file that is marked as read-only or that is in use. If the file is marked as read-only, you can change the read-only attribute with the ATTRIB command.

Allocation error, size adjusted

This error is a warning message. The contents of a file have been truncated because the size indicated in the directory is not large enough for the amount of data in this file. To correct this problem, use the CHKDSK /F command.

APPEND/ASSIGN Conflict

A DOS warning message. You cannot use APPEND on an assigned drive. Cancel the drive assignment before using APPEND with this drive.

Bad command or filename

The name you entered is not valid for invoking a command, program, or batch file. The most frequent causes are as follows:

- You misspelled a name.
- You omitted a needed disk drive or path name.
- You entered the parameters without the command name.

Check the spelling on the command line. Make sure that the command, program, or batch file is in the location specified (disk drive and directory path). Then try the command again.

Bad or missing Command Interpreter

MS-DOS cannot find the command interpreter, COMMAND.COM. MS-DOS does not start.

If this message appears when you start MS-DOS, COMMAND.COM is not on the boot disk, or a version of COMMAND.COM from a previous version of MS-DOS is on the disk. Place in the floppy disk drive another disk containing the operating system and then reboot the system. After MS-DOS starts, copy COMMAND.COM to the original start-up disk so that you can boot from that disk.

If this message appears while you are running MS-DOS, COMMAND.COM has been erased from the disk and directory you used when starting MS-DOS, or a version of COMMAND.COM from a previous MS-DOS has overwritten the good version. Restart MS-DOS by resetting the system.

If resetting the system does not solve the problem, use a copy of your MS-DOS master disk to restart the computer. Copy COMMAND.COM from this floppy disk to the problem disk.

Bad or missing filename

MS-DOS was directed to load a device driver that it could not locate, or an error occurred when DOS loaded the device driver. This message also might mean that a break address for the device driver is out of bounds for the size of RAM in the computer. MS-DOS continues to boot, but does not use the device driver.

If MS-DOS loads, check your CONFIG.SYS file for the line *DEVICE=filename*. Make sure that you spell the command correctly and that the device driver is where you specified. If this line is correct, reboot the system.

If the message appears again, copy the file from its original disk to the boot disk and boot MS-DOS again. If the error persists, contact the dealer who sold you the drive, because the device driver is bad.

Bad or Missing Keyboard definition file

A DOS warning message. DOS cannot find KEYBOARD.SYS as specified by the KEYB command. Solving this problem can take several steps. First check to see that KEYBOARD.SYS exists and that it is in the correct path. Then retype the KEYB command. If DOS displays the same message, KEYB.COM or KEYBOARD.SYS may be corrupted.

Bad Partition Table

A FORMAT error message. While using FORMAT, DOS was unable to find a DOS partition on the fixed disk you specified. To correct this problem, run FDISK and create a DOS partition on the fixed-disk drive.

Batch file missing

MS-DOS could not find the batch file it was processing; the batch file was renamed or erased. MS-DOS aborts the processing of the batch file.

If the batch file was renamed, rename it again using its original name. If necessary, edit the batch file to ensure that the file name is not changed again.

If the file was erased, recreate the batch file from its backup file (if possible). Edit the file to ensure that the batch file does not erase itself.

Cannot CHDIR to path - tree past this point not processed

CHKDSK was unable to go to the specified directory. All subdirectories beneath this directory are not verified. To correct this error, run CHKDSK /F.

Cannot CHDIR to root

A CHDIR error message. While checking the tree structure of the directory with CHKDSK, DOS was unable to return to the root directory and did not check the remaining subdirectories. Restart DOS. If DOS continues to display the message, the disk is unusable and must be reformated.

Cannot find System Files

While using FORMAT /S, you tried to use a drive that does not have the system files in the root directory.

Cannot load COMMAND.COM, system halted

MS-DOS attempted to reload COMMAND.COM, but DOS did not find the command processor, or the area where MS-DOS keeps track of available and used memory was destroyed. The system halts.

This message can indicate that COMMAND.COM has been erased from the disk and directory you used when starting MS-DOS. Restart MS-DOS. If DOS does not start, your copy of COMMAND.COM has been erased. Restart MS-DOS from the original master disks and copy COMMAND.COM to your working disk.

Another possible cause of this message is that a faulty program has corrupted the memory allocation table where MS-DOS tracks available memory. Reboot and then run the same program that was in the computer when the system halted. If the problem occurs again, the program is defective. Contact the dealer or manufacturer who sold you the program.

Cannot load COMMAND, system halted

DOS attempted to reload COMMAND.COM, but DOS did not find the command processor in the directory specified by the COMSPEC=entry, or the area where DOS keeps track of available and used memory was destroyed. The system halts.

This message can indicate that COMMAND.COM has been erased from the disk and directory you used when starting DOS or that the COMSPEC= entry in the environment has been changed. Restart DOS from your usual start-up disk. If DOS does not start, the copy of COMMAND.COM has been erased. Restart DOS from the DOS start-up or master disk and copy COMMAND.COM onto your usual start-up disk.

Another possible cause of this message is that a faulty program has corrupted the memory allocation table where DOS tracks available memory. Run the same program that was in the computer when the system halted. If the problem occurs again, the program is defective. Contact the dealer or manufacturer who sold you the program.

Cannot perform a cyclic copy

When using XCOPY /S, you cannot specify a target that is a subdirectory of the source. Depending on the directory tree structure, you may be able to use a temporary disk or file to overcome this limitation.

Cannot read file allocation table

You were attempting to regain data from good sectors in a bad or defective disk with the RECOVER command when DOS discovered that the file allocation table (FAT) is in a bad sector. Your disk is damaged, and recovering data from the bad sectors may be impossible.

Cannot recover . entry, processing continued

A CHKDSK warning message. While using CHKDSK, this message means that the "." entry (the working directory) is defective and cannot be recovered.

Cannot recover .. entry,
Entry has a bad attribute (or link or size)

An error and warning message. While using CHKDSK, DOS finds that the ".." entry (the parent directory) is defective and cannot be recovered.

If you specified the /F switch, CHKDSK tries to correct the error.

Cannot start COMMAND.COM, exiting

MS-DOS was directed to load an additional copy of COMMAND.COM, but could not. Either the FILES= command in your CONFIG.SYS file is set too low, or you do not have enough free memory for another copy of COMMAND.COM.

If your system has 256K or more of RAM, and FILES is less than 10, edit the CONFIG.SYS file on your start-up disk to use FILES = 20. Reboot your computer.

If the problem occurs again, you do not have enough memory in your computer, or you have too many programs competing for memory space. Restart MS-DOS again and do not load any resident or background programs that you do not need. If necessary, eliminate unneeded device drivers or RAM-disk software. An alternative is to increase the random-access memory in your system.

Configuration too large

DOS could not load itself because you specified too many FILES or BUFFERS in your CONFIG.SYS file, or you specified too large an environment area (/E switch) to the SHELL command. This problem usually occurs only on systems with less than 256K memory.

Restart MS-DOS with a different disk and edit the CONFIG.SYS file on your boot disk. Lower the number of FILES and BUFFERS or the number after the /E switch in the SHELL command. Restart MS-DOS with the edited disk. An alternative is to increase the memory in your system.

Content of destination lost before copy

The source file for COPY was overwritten before the command was completed. This error occurred because of a syntax problem. Restore the source file from your backup disk (or, you may be able to use Undelete to recover the file).

Current drive is no longer valid

You included the current path ($p) in the PROMPT command. MS-DOS attempted to read the current directory for the disk drive and found the drive no longer valid.

If the current disk drive is set for a floppy disk, you do not have a disk in the disk drive. MS-DOS reports a `Drive not ready` error. Press **F** to fail (the same as **A** to abort), or **I** to ignore the error. Then insert a floppy disk into the disk drive or type another drive designation.

An invalid-drive error also can happen if you have a networked disk drive that has been deleted or disconnected. In this case, simply change the current disk to a valid disk drive.

Data error reading drive d

DOS could not correctly read the data. Usually the disk has developed a defective spot.

Disk boot failure

An error occurred when MS-DOS tried to load itself into memory. The disk contained IO.SYS and MSDOS.SYS, but DOS could not load one of the two files. MS-DOS did not boot.

Start MS-DOS from the disk again. If the error recurs, boot MS-DOS from a disk that you know is good, such as a copy of your MS-DOS start-up or master disk. If this attempt fails, you have a hardware (disk drive) problem. Contact your dealer.

Disk unsuitable for system disk

FORMAT/S detected on the floppy disk one or more bad sectors in the area where DOS normally resides. Because DOS must reside on a specific position on the disk, and this position is unusable, you cannot use that floppy disk to boot DOS.

Reformat the floppy disk. Some floppy disks format successfully the second time. If FORMAT produces this message again, you cannot use that floppy disk as a boot disk.

Divide overflow

A program attempted to divide by zero. DOS aborts the program. The program was incorrectly entered, or it has a logic flaw. With a well-written program, this error should never occur. If you wrote the program, correct the error and run the program again. If you purchased the program, report the problem to the dealer or publisher.

Drive or diskette types not compatible

When using DISKCOMP or DISKCOPY, you specified drives of different capacities. You cannot, for example, DISKCOMP or DISKCOPY from a 1.2M drive to a 360K drive. Retype the command using like drives.

Drive not ready

An error occurred while MS-DOS tried to read or write to the disk drive. For floppy disk drives, the drive door may be open, the disk may not be inserted, or the disk may not be formatted. For hard disk drives, the drive may not be properly prepared, or you may have a hardware problem.

Duplicate filename or File not found

While using RENAME (or REN), you attempted to rename a file to a name that already existed, or the file you attempted to rename does not exist in the directory. Check the directory for the conflicting names. Make sure that the file name exists and that you have spelled it correctly, then try again.

Error in COUNTRY command

The COUNTRY directive in CONFIG.SYS is improperly phrased or has an incorrect country code or code page number. DOS continues its start-up, but uses the default information for the COUNTRY directive.

After DOS has started, check the COUNTRY line in your CONFIG.SYS file. Make sure that the directive is correctly phrased (using commas between country code, code page, and COUNTRY.SYS file) and that its information is correct.

If you detect an error in the line, edit the line, save the file, and restart DOS.

If you do not find an error, restart DOS. If the same message appears, edit your CONFIG.SYS file again, and reenter the COUNTRY directive and delete the old COUNTRY line. The old line may contain some nonsense characters that DOS can detect, but which are not apparent to your text-editing program.

Error in EXE file

MS-DOS detected an error while attempting to load a program stored in an EXE file. The problem is in the relocation information MS-DOS needs to load the program. This error can occur if the .EXE file has been altered in any way.

Restart MS-DOS and load the program again, this time using a backup copy of the program. If the message reappears, the program is flawed. If you are using a purchased program, contact the dealer or publisher.

Error loading operating system

A disk error occurred while MS-DOS was loading itself from the hard disk. MS-DOS does not boot.

Restart the computer. If the error occurs after several tries, restart MS-DOS from a floppy disk. If the hard disk does not respond (if you cannot run DIR or CHKDSK without an error message), your problem is with the hard disk. Contact your dealer. If the hard disk does respond, use the SYS command to put another copy of MS-DOS onto your hard disk. You may need to copy COMMAND.COM to the hard disk also.

Increase to 15 or 20 the number of FILES in the CONFIG.SYS file of your start-up disk. Restart DOS. If the error recurs, you may have a problem with the disk. Use a back-up copy of the program and try again. If the back-up works, copy it over the problem file.

If an error occurs in the copying process, you have a flawed floppy disk or hard disk. If the problem is the floppy disk, copy the files from the flawed disk

to another disk and reformat or retire the original disk. If the problem is the hard disk, immediately back up your files and run RECOVER on the problem file. If the problem persists, your hard disk may be damaged.

Error reading directory

MS-DOS encountered a problem while reading the directory during a format procedure, possibly because bad sectors have developed in the file allocation table (FAT) structure.

If the message occurs when DOS reads a floppy disk, the disk is unusable and should be discarded. If the message occurs when DOS reads your hard disk, however, the problem is more serious, and you may have to reformat your disk. Back up your data files on a regular basis to prevent major losses if a problem reading the directory occurs.

Error reading (or writing) partition table

MS-DOS could not read from (or write to) the disk's partition table during FORMAT. This error message indicates that the partition table is corrupted. Run FDISK on the disk and reformat the disk.

EXEC failure

MS-DOS encountered an error while reading a command or program from the disk, or the CONFIG.SYS FILES= command has too low a value.

Increase the number of FILES in the CONFIG.SYS file of your start-up disk to 15 or 20 and then restart MS-DOS. If the error recurs, you may have a problem with the disk. Use a backup copy of the program and try again. If the backup copy works, copy it over the problem copy.

If an error occurs in the copying process, you have a flawed floppy disk or hard disk. If the problem is a floppy disk, copy the files from the flawed disk to another disk and reformat or retire the original floppy disk. If the problem is the hard disk, immediately back up your files and run RECOVER on the problem file. If the problem persists, your hard disk may have a hardware failure.

File cannot be copied onto itself

You attempted to COPY a file to the same disk, directory, and file name. This message usually indicates that you misspelled or omitted parts of the source or destination drive, path, or file name. This error also can occur when you use wild-card characters for file names. Check your spelling and the source and destination names, then try the command again.

File creation error

MS-DOS or a program could not add a new file to the directory or replace an existing file.

If the file already exists, use the ATTRIB command to check whether the file is marked as read-only. If the read-only flag is set and you want to change or erase the file, use ATTRIB to remove the read-only flag, then try again.

If the problem is not the read-only flag, run CHKDSK without the /F switch to determine whether the directory is full, the disk is full, or some other problem exists with the disk.

File not found

MS-DOS could not find the file you specified. The file is not on the disk or in the directory you specified; or you misspelled the disk drive name, path name, or file name. Check these possibilities and try the command again.

Filename device driver cannot be initialized

In CONFIG.SYS, the parameters in the device driver file name are incorrect, or the DEVICE line is in error. Check for incorrect parameters and for phrasing errors in the DEVICE line. Edit the DEVICE line in the CONFIG.SYS file, save the file, and then restart DOS.

FIRST diskette bad or incompatible

or

SECOND diskette bad or incompatible

One of these messages may appear when you use the DISKCOMP command. The messages indicate that either the FIRST (source) or the SECOND (target) floppy disk is unreadable or that the disks you attempted to compare have different format densities.

Format not supported on drive x:

The FORMAT command cannot be used on the drive you selected. DOS displays this message if you entered device driver parameters that your computer cannot support. Check CONFIG.SYS for bad DEVICE or DRIVPARM commands.

General failure reading (or writing) drive d

This is a "catch-all" error message when MS-DOS encounters an error it does not recognize. The error usually occurs for one of the following reasons

- You are using an unformatted disk.
- The disk drive door is open.
- The floppy disk is not seated properly.
- You are using the wrong type of disk in a disk drive, such as formatting a 360K disk in a 1.2M disk drive.

Incorrect MS-DOS version

The DOS utility program for the command you just entered is from a different version of MS-DOS.

Find a copy of the program from the correct version of MS-DOS (usually from the MS-DOS master disk) and try the command again. If the floppy disk or hard disk you are using has been updated to hold new versions of the MS-DOS programs, copy those versions over the old ones. If you have more than one version of MS-DOS on your hard disk, make sure that your PATH command refers to the directory with the correct DOS files.

Insert disk with COMMAND.COM in drive d and strike any key when ready

MS-DOS needs to reload COMMAND.COM, but cannot find it on the start-up disk.

If you are using floppy disks, the disk in drive A probably has been changed. Place a disk with a good copy of COMMAND.COM in drive A and press any key.

Insert disk with batch file and strike any key when ready

DOS attempted to execute the next command from a batch file, but the disk holding the batch file is not in the disk drive.

Put the disk holding the batch file into the disk drive and press any key to continue.

Insufficient disk space

The disk does not have enough free space to hold the file being written. All MS-DOS programs terminate when this problem occurs, but some non-DOS programs continue.

If you think that the disk has enough room to hold the file, run CHKDSK to see whether the floppy disk or hard disk has a problem. Sometimes when you terminate programs early by pressing Ctrl-Break, MS-DOS cannot do the necessary clean-up work. When this happens, disk space is temporarily trapped. CHKDSK can "free" these areas.

If you have run out of disk space, free some disk space or use a different floppy disk or hard disk. Then try the command again.

Insufficient memory

The computer does not have enough free RAM to execute the program or command.

If you have loaded a RAM-resident program like SideKick or DOSKEY, restart MS-DOS and try the program or command before loading any resident program. If this step fails, remove any unneeded device driver or RAM-disk software from the CONFIG.SYS file and restart MS-DOS again. If this action fails, your computer does not have enough memory for the program or command. You must increase your random-access memory to run the program or command.

Insufficient memory to store macro. Use the DOSKEY command with the /BUFSIZE switch to increase available memory.

Your DOSKEY macros have filled the space set aside for them, and you cannot enter any new macros until you enlarge the memory area (the default is 1024 bytes). The BUFSIZE switch enables you to increase the amount of memory reserved for DOSKEY macros.

Intermediate file error during pipe

MS-DOS is unable to create or write to one or both of the intermediate files it uses when piping information between programs. The disk is full, the root directory of the current disk is full, or DOS cannot find the files. The most frequent cause is running out of disk space.

Run the DIR command on the root directory of the current disk drive. Make sure that you have enough free space and enough room in the root directory for two additional files. If you do not have enough room, create room on the disk by deleting or copying and deleting files. You also can copy the necessary files to a different disk.

Another possible cause of this error is that a program is deleting files, including the temporary files DOS uses. If this is the case, you should correct the program, contact the dealer or program publisher, or avoid using the program with piping.

Internal stack over flow System halted

Your programs and DOS have exhausted the stack (the memory space reserved for temporary use). This problem usually is caused by a rapid succession of hardware devices demanding attention (interrupts). DOS stops, and the system must be turned off and on again to restart DOS.

The circumstances that cause this message usually are infrequent and erratic and may not recur. If you want to prevent this error from occurring at all, add the STACKS directive to your CONFIG.SYS file. If the directive is already in your CONFIG.SYS file, then increase the number of stacks specified.

Invalid characters in volume label

A FORMAT error message and label. You attempted to enter more than 11 alphanumeric characters, or you entered illegal characters (for example, +, =, /, \, or |) when you typed the disk's volume label (the disk name). Retype the volume label, following the proper procedure.

Invalid COMMAND.COM in drive d

MS-DOS tried to reload COMMAND.COM from the disk in drive *d* and found that the file was of a different version of MS-DOS. DOS instructs you to insert a disk with the correct version and press a key. Follow these directions.

If you frequently use the disk that was in drive *d*, copy the correct version of COMMAND.COM to that disk.

Invalid COMMAND.COM, system halted

MS-DOS could not find COMMAND.COM on the hard disk. MS-DOS halts and must be restarted.

COMMAND.COM may have been erased, or the COMSPEC variable in the environment may have been changed. Restart the computer from the hard disk. If DOS displays a message indicating that COMMAND.COM is missing, the file was erased. Restart MS-DOS from a floppy disk and recopy COMMAND.COM to the root directory of the hard disk.

If you restart MS-DOS and this message appears later, a program or batch file may be erasing COMMAND.COM. If a batch file is erasing COMMAND.COM,

edit the batch file. If a program is erasing COMMAND.COM, contact the dealer or publisher who sold you the program.

Invalid date

You entered an impossible date or used the wrong kind of character to separate the month, day, and year. DOS also displays this message if you enter the date with the keypad when the keypad is not in numeric mode.

Invalid device parameters from device driver

A FORMAT error message that DOS displays when it finds that the disk partition does not fall on a track boundary. You may have set the DEVICE drivers incorrectly in CONFIG.SYS or attempted to format a hard disk that was formatted with DOS V2.X (so the total number of hidden sectors is not evenly divisible by the number of sectors on a track). As a result, the partition does not start on a track boundary.

To correct the error, run FDISK before performing a format or check CONFIG.SYS for a bad DEVICE or DRIVPARM command.

Invalid directory

One of the following errors occurred:

- You specified a directory name that does not exist.
- You misspelled the directory name.
- The directory path is on a different disk.
- You didn't type the path character (\) at the beginning of the name.
- You didn't separate the directory names with the path character.

Check your directory names, ensure that the directories do exist, then try the command again.

Invalid disk change

The disk in the 720K, 1.2M, or 1.44M disk drive was changed while a program had open files to be written to the disk. DOS displays the message `Abort, Retry, Fail`. Place the correct disk in the disk drive and press **R** for Retry.

Invalid drive in search path

A specification you entered in the PATH command has an invalid disk drive name, or a named disk drive is nonexistent.

Use PATH to check the paths you instructed MS-DOS to search. If you used a nonexistent disk drive name, use the PATH command again to enter the correct search paths. (Or, you can just ignore the warning message.)

Invalid drive or file name

An error message. You entered the name of a nonexistent disk drive; or you mistyped the disk drive, the file name, or both. Check the disk drive name and try the command again.

Invalid drive specification

DOS displays this message when one of the following errors occurs:

- You entered the name of an invalid or nonexistent disk drive as a parameter to a command.
- You entered the same disk drive for the source and destination, which is not permitted for the command.
- By omitting a parameter, you defaulted to the same source and destination disk drive.

Check the disk drive names; if the command is missing a parameter and defaulting to the wrong disk drive, explicitly name the correct disk drive.

Invalid drive specification
Specified drive does not exist, or is non-removable

One of the following errors occurred:

- You entered the name of a nonexistent disk drive.
- You named the hard disk drive when using commands for floppy disks only.
- You omitted a disk drive name, and defaulted to the hard disk when using commands for floppy disks only.
- You named or defaulted to a RAM-disk drive when using commands for a true floppy disk drive.

Certain MS-DOS commands temporarily hide disk drive names while the command is in effect. Check the disk drive name you entered and try the command again.

Invalid media or Track 0 bad - disk unusable

A FORMAT error message. The disk you are trying to format may be damaged, but often a disk does not format the first time. Try to format the disk again; if the same message appears, the disk is bad and should be discarded.

Invalid number of parameters

You have entered too few or too many parameters for a command. One of the following errors occurred:

- You omitted required information.
- You excluded a colon immediately after the disk drive name.
- You put a space in the wrong place or omitted a needed space.
- You omitted a slash (/) in front of a switch.

Invalid parameter Incorrect parameter

At least one parameter you entered for the command is not valid. One of the following occurred:

- You omitted required information.
- You omitted a colon immediately after the disk drive name.
- You put a space in the wrong place or omitted a needed space.
- You didn't add a slash (/) in front of a switch.
- You used a switch the command does not recognize.

For more information, check the explanation of this message in Chapter 11's Command Reference under the command you were using when the message occurred.

Invalid parameter combination

When you entered an MS-DOS command, you typed parameters that conflict. Retype the command, using only one of the conflicting switches.

Invalid partition table

When you started DOS from the hard disk, DOS detected a problem in the hard disk's partition information.

Restart MS-DOS from a floppy disk. Back up all files from the hard disk (if possible) and run FDISK to correct the problem. If you change the partition information, reformat the hard disk and restore all its files.

Invalid path

One of the following errors has occurred:

- The path name contains illegal characters.
- The path name has more than 63 characters.
- One of the directory names within the path is misspelled or does not exist.

Check the spelling of the path name. If needed, find a directory listing of the disk to ensure that the directory you specified does exist and that you have the correct path name. Be sure that the path name contains no more than 63 characters. If necessary, change the current directory to a directory "closer" to the file to shorten the path name.

Invalid path or file name

You entered a directory name or file name that does not exist, used the wrong directory name (a directory not on the path), or mistyped a name. COPY aborts when it encounters an invalid path or file name. If you used wild-card characters in a file name, COPY transfers all valid files before it issues the error message.

Check to see which files were transferred. Determine whether the directory and file names are spelled correctly and whether the path is correct. Then try the command again.

Invalid time

You entered an impossible time or used the wrong kind of character to separate the hours, minutes, and seconds. DOS also displays this message if you enter the time with the keypad when the keypad is not in numeric mode.

Invalid Volume ID

A FORMAT error message. During the formatting of a fixed (hard) disk, you entered an incorrect volume label (the name of the disk drive). DOS aborts the format attempt.

To view the volume label of the disk, type **VOL** at the prompt and press ↵Enter. Then try the command again.

Lock violation

With the file-sharing program (SHARE.EXE) or network software loaded, one of your programs attempted to access a locked file. First try **R**etry; if

unsuccessful, try Abort or Fail. (If you choose abort or fail, however, you lose any data in memory.)

Memory allocation error
Cannot load COMMAND, system halted

A program damaged the area where MS-DOS keeps track of available and used memory. You must restart MS-DOS.

If this error occurs again with the same program, use a backup copy of the program. If the problem persists, the program has a flaw. Contact the dealer or program publisher.

MIRROR cannot operate with a network.

MIRROR cannot save file reconstruction information because your computer's hard disk is currently redirected to a network.

Missing operating system

The MS-DOS hard disk partition does not have a copy of MS-DOS on it. MS-DOS does not boot.

Start MS-DOS from a floppy disk. Use the SYS C: command to place DOS and COMMAND.COM on the hard disk. If this command fails to solve the problem, back up the existing files (if any) from the hard disk, then issue the FORMAT /S command to put a copy of the operating system on the hard disk. If necessary, restore the files that you backed up.

No free file handles
Cannot start COMMAND, exiting

MS-DOS could not load an additional copy of COMMAND.COM because no file handles were available.

Edit the CONFIG.SYS file on your start-up disk to increase the number of file handles (using the FILES command) by five. Restart DOS and try the command again.

Non-DOS disk

MS-DOS does not recognize the disk format as a DOS disk. This disk is unusable. Abort and run CHKDSK to learn whether any corrective action is possible. If CHKDSK fails, an alternative is to reformat the disk.

Reformatting destroys any information remaining on the disk. If you have disks from another operating system, this disk was probably formatted under the other operating system and should not be reformatted.

No room for system on destination disk

The floppy disk or hard disk was not formatted with the necessary reserved space for MS-DOS. You cannot put the system on this floppy disk without first copying all the disk's data to another disk and then reformatting the disk.

Non-System disk or disk error Replace and strike any key when ready

Your floppy disk or hard disk does not contain MS-DOS, or a read error occurred when you started the system. MS-DOS does not boot. If you are using a floppy disk system, put a bootable disk in drive A and press any key.

The most frequent cause of this message on hard disk systems is that you left a nonbootable floppy disk in drive A with the drive door closed. Open the door to disk drive A and press any key. MS-DOS boots from the hard disk.

No paper

The printer is out of paper or is turned off.

No system on default drive

SYS could not find the system files. Insert a disk containing the system files, such as the DOS disk, and enter the command again.

No target drive specified

You did not specify a target drive when you typed a backup command. Retype the command, using first a source and then a target disk drive.

Not enough memory

The computer does not have enough free memory to execute the program or command.

If you loaded a RAM-resident program, such as SideKick or DOSKEY, restart MS-DOS and try the program or command again before loading any resident program. If this method fails, remove any unneeded device driver or RAM-disk software from the CONFIG.SYS file and restart MS-DOS.

If this procedure fails, your computer does not have enough memory for this operation. You must increase your RAM to run the program or command.

Not ready

A device is not ready and cannot receive or transmit data. Check the connections, check that the power is on, and check whether the device is ready. For floppy disk drives, check that the disk is formatted and properly seated in the disk drive.

Out of environment space

DOS is unable to add any more strings to the environment from the SET command. The environment cannot be expanded. This error occurs when you load a resident program, such as DOSSHELL, MODE, PRINT, GRAPHICS, or SideKick.

Out of memory

The amount of memory is insufficient to perform the operation you requested. This error occurs in EDIT, the DOS full-screen text editor.

Packed File Corrupt

A program file did not successfully load into the first 64K of memory. This error can occur when a packed executable file is loaded into memory. Use the LOADFIX command to load the program above the first 64K.

Parameters not supported

or

Parameters not supported on drive

You entered parameters for a command that do not exist, are not supported by MS-DOS, or are incompatible with the disk drive that you selected.

Path not found

A file or directory path you named does not exist. You misspelled the file name or directory name, or you omitted a path character (\) between directory names or between the final directory name and file name. Another possibility is that the file or directory does not exist where you specified. Check these possibilities and try again.

Path too long

You entered a path name that exceeds the 63 character limit of MS-DOS. The name is too long, or you omitted a space between file names. Check the

command line. If the phrasing is correct, change to a directory that is closer to the file you want and try the command again.

Program too big to fit in memory

The computer does not have enough memory to load the program or command you invoked. Type **EXIT** to ensure that you do not have another application program in memory.

If you have any resident programs loaded (such as DOSKEY), restart MS-DOS and try the command again without loading the resident programs. If this message appears again, reduce the number of buffers (BUFFERS=) in the CONFIG.SYS file and eliminate unneeded device drivers or RAM-disk software. Restart MS-DOS. If these actions do not solve the problem, your computer lacks the memory needed to run the program or command. You must increase the amount of RAM in your computer to run the program or command.

Read fault error reading drive d

MS-DOS was unable to read the data, usually from a hard disk or floppy disk. Check that the disk drive door is closed and that the disk is properly inserted.

Same parameter entered twice

You duplicated a switch when you typed a command. Retype the command, using the parameter only once.

Sector not found error reading drive d

The disk drive was unable to locate the sector on the floppy disk or hard disk platter. This error is usually the result of a defective spot on the disk or defective drive electronics. Some copy-protection schemes use a defective spot to prevent unauthorized duplication of the disk.

Seek error reading (or writing) drive d

The disk drive could not locate the proper track on the floppy disk or hard disk. This error is usually the result of a defective spot on the floppy disk or hard disk platter, an unformatted disk, or drive electronics problems.

SOURCE diskette bad or incompatible

The disk you are copying is damaged or is the wrong format (for example, a high density 5 1/4-inch disk in a double-density 5 1/4-inch disk drive). DOS cannot read the disk.

Syntax error

You phrased a command improperly for one of the following reasons:

- You omitted needed information.
- You entered extraneous information.
- You put an extra space in a file name or path name.
- You used an incorrect switch.

Check the command line for these possibilities and try the command again.

TARGET diskette bad or incompatible

or

Target diskette may be unusable

or

Target diskette unusable

This DISKCOPY message indicates that a problem exists with the target disk; MS-DOS does not recognize the format of the target disk in the drive or the disk is bad.

Check that the disk is the same density as the source disk, run CHKDSK on the target disk to determine the problem, or try to reformat the disk before proceeding with the disk copy operation.

TARGET media has lower capacity than SOURCE
Continue anyway (Y/N)?

This DISKCOPY warning message informs you that the target disk can hold fewer bytes of data than the source disk. The most likely cause is a target disk with bad sectors. If you type a **Y** (Yes), some of the data on the source disk may not fit onto the target disk.

To avoid the possibility of an incomplete transfer of data, type **N** and use a disk that has the same capacity as the source disk; or (if you are not copying "hidden" files), you can use the COPY *.* command to transfer the files.

```
There is not enough room to create a
restore file
You will not be able to use the unformat utility
Proceed with Format (Y/N)?
```

FORMAT has determined that the disk lacks sufficient room to create a restore file. Without this file, you cannot use the UNFORMAT command to reverse the format that you are attempting.

Unable to create directory

You or a program attempted to create a directory and one of the following errors occurred:

- A directory of the same name exists.
- A file of the same name exists.
- You tried to add a directory to a root directory that is full.
- The directory name has illegal characters or is a device name.

List the directories of the disk. Make sure that no file or directory with the same name already exists. If you are adding the directory to the root directory, remove or move (copy and then erase) any unneeded files or commands. Check the spelling of the directory and ensure that the command is properly phrased.

Unable to load MS-DOS Shell, Retry (y/n)?

DOS could not load the Shell. You may have another program in memory, and the Shell won't fit into memory. Or, the DOS Shell program itself may be corrupted.

Exit the program and try to load the Shell. If the Shell still doesn't load, it is probably corrupt. Reboot your system and load the Shell. If the same error message appears, copy the Shell from a backup disk to your hard disk.

Unable to write BOOT

FORMAT could not write to the first (or BOOT) track or DOS partition of the disk that you are formatting because one of these areas is bad. Discard the bad disk, insert another unformatted disk, and try the FORMAT command again.

Unrecognized command in CONFIG.SYS

MS-DOS detected an improperly phrased directive in CONFIG.SYS. The directive is ignored, and MS-DOS starts. Examine the CONFIG.SYS file, looking

for improperly phrased or incorrect directives. Edit the line, save the file, and restart MS-DOS.

Unrecoverable read error on drive x side n, track n

MS-DOS could not read the data at the described location on the disk. (MS-DOS makes four attempts before generating this message.) Copy all files on the questionable disk to another disk and try the command again, first with a new disk and then with the backup disk. If the original disk cannot be reformatted, discard it.

Unrecoverable write error on drive x Side n, track n

MS-DOS was unable to write to a disk at the location specified. Try the command again; if the same error occurs, the target disk is damaged at that location.

If the damaged disk contains important data, copy the files to an empty, newly formatted disk and try to reformat the damaged disk. If the disk is bad, discard it.

Write fault error writing drive d

MS-DOS could not write the data to this device. You may have inserted the floppy disk improperly or left the disk drive door open. Another possibility is an electronics failure in the floppy or hard disk drive. The most frequent cause is a bad spot on the disk.

Write protect error writing drive d

You tried to write data to a disk that is write-protected. Use a different disk or remove the write-protection tab on a 5-1/4 inch disk or slide the write-protection tab to the write-enable position on a 3-1/2 inch disk.

15

Appendix A

Setup and Installation

This appendix tells you how to install or upgrade to MS-DOS 5. Why put this at the end of the book if it's the first thing you must do? The answer is simple. Many computers are sold today with DOS already installed on the hard disk. Also, if you use your computer at work, you may have an Information Center or PC Support Group that installs DOS and other software on your hard disk for you.

If DOS is installed on your computer, you can skip this appendix for now. Go right to Chapter 1 and start to learn about MS-DOS 5 from the beginning. You may need this information later to help you upgrade to a new version of DOS.

Installing MS-DOS on a hard disk

Installing MS-DOS on a floppy disk

Upgrading from a previous version of DOS

Key Terms Used in This Appendix

Low-level format	The process that physically prepares a hard disk so that it can be used by DOS. This process is not the same as the DOS Format command and is not a part of DOS.
Boot	To start your computer and load DOS into the computer's memory.
Partition	A section of a hard disk set-up so that it can be used by DOS. A partition can be all or part of a hard disk. Each partition has a separate drive letter and is considered a separate disk by DOS.
Working disks	Copies of the original DOS disks. If anything should happen to your working disks, you can recreate them from your original DOS disks.
Uninstall	The process of reverting to your prior version of DOS if you have a problem after you upgrade to MS-DOS 5.

Requirements to Install MS-DOS 5

MS-DOS 5 can run on any PC with at least 256K memory. Virtually every PC sold since 1983 has at least this much memory. Computers sold since 1986 usually have the maximum of 640K conventional memory. If you plan to install MS-DOS 5 on a hard disk, you need at least 512K memory and 2.5 megabytes of available disk space.

```
C:\>chkdsk

Volume DRIVE_C     created 10-03-1990 3:45p
Volume Serial Number is 166D-BDE3

  27553792 bytes total disk space
     75776 bytes in 3 hidden files
    112640 bytes in 48 directories
  24080384 bytes in 920 user files
     20480 bytes in bad sectors
   3264512 bytes available on disk

      2048 bytes in each allocation unit
     13454 total allocation units on disk
      1594 available allocation units on disk

    655360 total bytes memory
    605232 bytes free

C:\>
```

This computer has over 2.5 megabytes of available space.

If you are upgrading from a previous version of DOS, execute CHKDSK to determine the amount of available disk space. If less than 2.5 megabytes are available, use COPY or BACKUP to copy some or all of the files on the hard disk to floppy disks. Then delete enough files from the hard disk so that at least 2.5 megabytes are available.

If you plan to install MS-DOS 5 on floppy disks, you need a supply of blank disks that fit into drive A. If drive A is a 5-1/4 inch drive, for example, you need seven 360K floppy disks. If drive A is a 3-1/2 inch drive, you need four 720K disks.

Making Backup Copies

If your computer has a previous version of DOS installed or you have another computer available with any version of DOS installed, your first step is to make backup copies of the DOS disks.

If you are installing DOS on your computer for the first time and you have no other computers available, you cannot make backup copies until you complete the installation. In this case, you may want to ask your computer dealer to make backup copies of the DOS disks for you, or to install DOS on your hard disk for you.

If you cannot copy the DOS disks and cannot successfully complete the installation because you get errors reading the DOS disks, contact your computer dealer immediately and get replacement disks.

To make backup copies of the DOS disks, you need five or six 5 1/4-inch, 360K floppy disks or three 3 1/2-inch, 720K disks. If you have two floppy disk drives that are the same size, follow these instructions:

1. Type **DISKCOPY A: B:/V** and press ↵Enter.
2. At the prompt to insert the SOURCE disk in drive A, put the original MS-DOS 5 disk labeled "Disk 1" in drive A.
3. You are prompted to insert the TARGET disk in drive B.

   If you have two 5 1/4-inch drives, put a blank 360K floppy disk in drive B, close the drive door, and press ↵Enter. This disk does not have to be formatted.

   or

   If you have two 3 1/2-inch drives, put a blank 720K disk in drive B and press ↵Enter. This disk does not have to be formatted.
4. When the DISKCOPY process is complete, remove the disks from both drives and label the new disk "MS-DOS 5 - Disk 1."
5. At the prompt `Copy another disk (Y/N)?` press **Y**, press ↵Enter, and repeat Steps 2 through 4 for each original MS-DOS 5 disk.
6. When you complete the DISKCOPY for the last original MS-DOS 5 disk, you are asked whether you want to copy another disk. Press **N** and then press ↵Enter.

If you have only one floppy disk drive or drive A and drive B are different sizes, follow these steps:

1. Type **DISKCOPY A: A:/V** and press ↵Enter.
2. When you are prompted, place the original MS-DOS 5 disk labeled "Disk 1" in drive A and press ↵Enter.
3. At the prompt to insert the TARGET disk in drive A, remove the original MS-DOS 5 disk and insert a blank 360K or 720K disk into drive A and press ↵Enter. This disk does not have to be formatted.
4. You may be prompted to remove the TARGET disk and insert the SOURCE disk again. You then are prompted to insert the TARGET disk again. Switch the same two disks as prompted until the DISKCOPY completes.
5. When the DISKCOPY process is complete, remove the disk from drive A and label the new disk "MS-DOS 5 - Disk 1."
6. When you complete the DISKCOPY for the last original MS-DOS 5 disk, you are asked whether you want to copy another disk. Press **Y** and then press ↵Enter. Repeat Steps 2 through 5 for each original MS-DOS 5 disk.
7. When you complete the DISKCOPY for the last original MS-DOS 5 disk, press **N** and then press ↵Enter.

If the DISKCOPY fails, repeat the process using a different blank disk. If you cannot successfully DISKCOPY each original MS-DOS 5 disk, contact your dealer for a replacement disk.

Store the original MS-DOS 5 disks in a safe place and use the copies. If you get any errors using a copy of one of the DOS disks, repeat the DISKCOPY process to recreate that disk. If you cannot make a copy of the disk that you can use for the install, contact your dealer for a replacement.

In all subsequent instructions, any reference to an original DOS disk refers to the copy of the original that you just made. If you are installing DOS for the first time and do not have copies, you must use the original disks.

Installing MS-DOS 5

If you are installing MS-DOS 5 on a hard disk that already contains a copy of DOS, version 2.11 or later, skip this section and read the section: "Upgrading from a Previous Version of DOS." If you have a new hard disk, or a hard disk with a DOS version prior to 2.11, you should install MS-DOS 5 as if your hard disk did not contain DOS.

If you are not upgrading a previous version of DOS, make sure that you have the MS-DOS 5 OEM package. If you have the MS-DOS 5 Upgrade package, you will not be able to boot your computer.

Installing on a Hard Disk

This section describes how to install MS-DOS 5 on a hard disk that does not contain a version of DOS. You have many options and possible configurations with a new hard disk. In this book, the basic configuration that is used by most people is covered. If you plan to install multiple partitions or you have multiple hard disks, consult *Que's MS-DOS 5 User's Guide,* Special Edition or the DOS manual.

Before DOS can use a hard disk, the disk must be low-level formatted. Low-level formatting is not the same as the DOS FORMAT command. A low-level formatting program is not supplied with DOS. When you buy a new hard disk or a new computer with an installed hard disk, the dealer usually has formatted the disk. In some cases, the dealer supplies a separate program to low-level format the drive. If you cannot install DOS because DOS does not recognize the hard disk, the disk has not been low-level formatted. If you do not have a low-level formatting program, contact your dealer.

To install DOS on a hard disk, follow these instructions:

1. Place Disk 1 in drive A and close the drive door if applicable.
2. Turn on your computer. If your computer is on, hold down the Ctrl and Alt keys and press the Del key, and then release all three keys. This procedure boots or restarts the computer. DOS loads and starts the SETUP procedure.
3. The SETUP procedure checks your hardware and starts the installation process. From time-to-time DOS asks you for the following information:
   - The date and time
   - The country
   - The keyboard type
   - Whether to install DOS on a hard disk or floppy disks
   - For hard disk installation, which directory to use for the DOS files

   For most of this information, SETUP offers a default response. Usually you can accept the defaults for U.S. installation, with a USA keyboard. For hard disk installation, DOS is installed on drive C in the C:\DOS directory by default.

   DOS also gives you the option to continue or cancel the installation throughout the installation process. If you cannot complete the installation for any reason, you can start from the beginning at a later time.
4. When you are prompted to insert a different disk, remove the disk from drive A and insert the requested disk, close the drive door if appropriate, and press ↵Enter. If you insert the wrong disk, DOS tells you and gives you a chance to insert the correct disk.
5. Before DOS can use a hard disk, it must establish the disk as a DOS disk and assign it a logical drive letter, such as drive C. If the drive has not been partitioned, SETUP runs the FDISK program to partition the disk. Accept the defaults to use the entire disk as a single DOS partition.
6. After the disk is partitioned, SETUP formats the disk. This format establishes the disk directory and File Allocation Table. The DOS Format command is explained in Chapter 6. After the format is complete, you can give the disk a volume label of one to 11 characters, or press ↵Enter and not give the hard disk a label.
7. SETUP then copies the DOS files onto the hard disk. SETUP displays a horizontal bar that shows what percentage of the total installation

process is complete. SETUP displays the current activity in the lower right corner of the screen.

8. When the installation process is complete, remove the disk from drive A and hold down the Ctrl and Alt keys and press the Del key; then release all three keys. This process reboots or restarts the computer using the files on the hard disk.

   The installation process on the hard disk is complete.

Installing on Floppy Disks

If you do not have a hard disk, you can install MS-DOS 5 on floppy disks. If drive A is a 5 1/4-inch drive, you need seven 360K disks. If drive A is a 3 1/4-inch drive, you need four 720K disks. These disks can be unformatted.

If you have a 5 1/4 inch drive, label the 360K disks as follows:

Startup
Support
Shell
Help
/Edit
Utility
Supplemental

If you have a 3 1/2-inch drive, label the 720K disks as follows:

Startup/Support
Shell/Help
Basic/Edit/Utility
Supplemental

These disks are your operating disks. You will use these disks to run DOS. After you complete this process, store the original DOS disks in a safe place and use the operating disks.

To install DOS on floppy disks, follow these steps:

1. Place Disk 1 in drive A and close the drive door, if applicable.
2. Turn on your computer. If your computer is on, hold down the Ctrl and Alt keys and press the Del key; then release all three keys. This process boots or restarts the computer. DOS loads and starts the SETUP procedure.

3. The SETUP procedure checks your hardware and starts the installation process. From time-to-time DOS asks you for the following information:
   - The date and time
   - The country
   - The keyboard type
   - Whether to install DOS on a hard disk or floppy disk

   For most of this information, SETUP offers a default response. If you are using a USA keyboard, you usually can accept the defaults for US installation. Respond to install DOS on floppy drives.

   DOS also gives you the option to continue or cancel the installation throughout the process. If you cannot complete the installation for any reason, you can start from the beginning at a later time.
4. When you are prompted to insert a different disk, remove the disk from drive A and insert the requested disk, close the drive door if appropriate, and press Enter. If you insert the wrong original DOS disk, DOS gives you a chance to insert the correct disk.
5. SETUP prompts you to insert each of the operating DOS disks that you labeled previously. The program then copies the DOS files onto each floppy disk. SETUP displays a horizontal bar that shows what percentage of the total installation process is complete. SETUP displays the current activity in the lower right corner of the screen.
6. When the installation process is complete, remove the disk from drive A and insert the operating Setup disk. Hold down the Ctrl and Alt keys and press the Del key; then release all three keys. This process reboots or restarts the computer using the new working DOS disk.

   The installation process on floppy disks is complete.

Upgrading from a Previous Version of DOS

If you already have DOS version 2.11 or greater installed on your hard disk, you can upgrade to MS-DOS 5 without having to partition or format your hard disk.

If you have a version of DOS prior to version 2.11, you cannot upgrade. You must back up your entire hard disk, except for DOS files, and then install MS-DOS 5 using the procedures in the preceding section. Then restore your files to the new hard disk. BACKUP and RESTORE procedures are discussed in Chapter 10.

This section describes how to upgrade a DOS disk with a previous version of DOS to MS-DOS 5. If you have a non-standard disk that requires special device drivers in CONFIG.SYS, these procedures may not work. Also, you may want to change partition sizes if you are using a version of DOS prior to DOS 4.0, and you have a hard disk bigger than 32 megabytes. In these cases, consult *Que's MS-DOS 5 User's Guide,* Special Edition or the DOS manual for more detailed, technical information that is outside the scope of this book.

If you want to upgrade, make sure that you purchase the MS-DOS 5 Upgrade package. This software package differs from the MS-DOS 5 package for initial installation. If you have an existing hard disk with files that you want to keep, make sure that you have the correct package. If the DOS disks are not labeled "Upgrade," contact your dealer before you attempt to upgrade your hard disk.

The procedure to upgrade your hard disk from a previous version of DOS is similar to the procedure to install MS-DOS 5 on a new disk. Some significant differences do exist, however. When you upgrade, you have data on your hard disk that you do not want to lose. Part of the upgrade procedure is to back up all the files on your hard disk and save your old version of DOS.

Before you start the upgrade, make sure that you have one or two blank floppy disks that fit into drive A. This disk or disks serve as uninstall disks and enable you to revert to your existing version of DOS if you have problems after you install MS-DOS 5. If you have a 5 1/4-inch drive A, you need either two 360K disks or one 1.2M disk. If you have a 3 1/2-inch drive A, you need either one 720K or one 1.44M disk. If you have one disk, label it Uninstall. If you have two 360K disks, label them Uninstall #1 and Uninstall #2. Uninstall disks may be blank, formatted disks or unformatted disks.

To upgrade your hard disk, follow these steps:

1. Copy your AUTOEXEC.BAT and CONFIG.SYS files to a floppy disk. You may need them later.
2. Quit out of any shell programs or task switching programs such as a DOS Shell, Windows, DESQView, or Software Carousel.
3. Place Disk 1 in drive A and close the drive door if applicable.
4. Type **A:SETUP** and press ↵Enter.
5. The SETUP procedure checks your hardware and starts the installation. You are asked whether you want to back up the data on your hard disk before you upgrade. If you do have a complete backup, you can press **N**. If you do not have a complete backup, you press **Y**.

6. DOS estimates how many floppy disks you need for the backup. Make sure that you have sufficient floppy disks, and follow the prompts to insert each backup disk until the entire disk is backed up.
7. When the backup is complete, you can continue the upgrade or exit. Unless you encounter a problem with the backup procedure, continue with the setup.
8. As the upgrade proceeds, you will be prompted for certain information, such as in which directory to put the MS-DOS 5 files. By default, DOS is placed on drive C in the C:\DOS directory.
9. When prompted, insert the Uninstall disk or disks into drive A and press ↵Enter.
10. When you are prompted to insert a different disk, remove the disk from drive A and insert the requested disk, close the drive door if appropriate, and press ↵Enter. If you insert the wrong DOS disk, DOS tells you and gives you a chance to insert the correct disk.
11. During the upgrade, SETUP renames your AUTOEXEC.BAT file AUTOEXEC.OLD and renames your CONFIG.SYS file CONFIG.OLD. It also renames the directory that contains your existing DOS files to OLD_DOS.1. (If you already have an OLD_DOS.1, SETUP renames the directory OLD_DOS.2, and so on.)
12. SETUP then copies the DOS files to the hard disk. SETUP displays a horizontal bar that shows what percentage of the total installation process is complete. SETUP displays the current activity in the lower right corner of the screen.
13. SETUP asks you whether you want to start in the DOS Shell when you boot your computer. It is a good idea to learn to use the DOS Shell first. If you reply Yes, SETUP adds the statement to your AUTOEXEC.BAT file. SETUP may make other changes to your AUTOEXEC.BAT or CONFIG.SYS files.
14. When the install process is complete, remove the disk from drive A and hold down the Ctrl and Alt keys and press the Del key; then release all three keys. This process reboots or restarts the computer using the files on the hard disk.

The upgrade process on the hard disk is complete.

Upgrading on Floppy Disks

You really do not "upgrade" your existing floppy disks to MS-DOS 5. You create a new set of DOS floppy disks. You can install MS-DOS 5 on floppy disks with either the MS-DOS 5 OEM package or the MS-DOS 5 Upgrade package.

If you have the Upgrade package, first boot your computer with your current version of DOS. Then insert Disk 1 into drive A and type **A:SETUP /F** and press ↵Enter. Then follow the instructions for "Installing on Floppy Disks." If you have the OEM package, follow the instructions for "Installing on Floppy Disks."

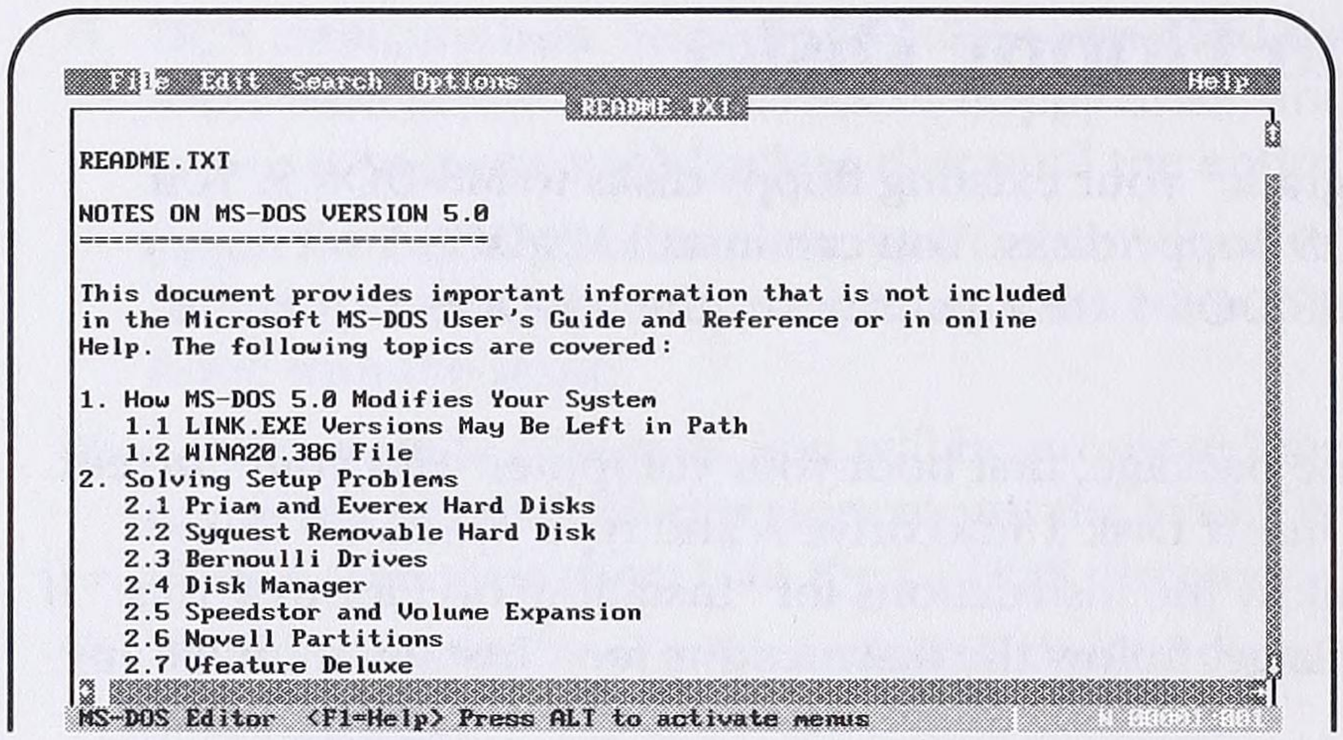
After the Installation or Upgrade Is Complete

In most cases, after you complete the installation or the upgrade, you are ready to use your computer. In some cases, however, you must do some additional work so that you can improve the way DOS runs.

In the directory in which you installed DOS, such as C:\DOS, the README.TXT file contains additional information about DOS and the installation process.

If you have a 286, 386, or 486 computer with extended memory, read the README.TXT file. You may have to modify the HIMEM command if you have one of the following computers:

- IBM PS/2
- a computer with a Phoenix Cascade BIOS
- HP "Classic" Vectra
- AT&T 6300 Plus
- Acer 1100
- Toshiba 1600 or 1200 XE
- WYSE 12.5 MHz 286 with micro channel


File Edit Search Options Help
README.TXT
README.TXT
NOTES ON MS-DOS VERSION 5.0
This document provides important information that is not included
in the Microsoft MS-DOS User's Guide and Reference or in online
Help. The following topics are covered:
1. How MS-DOS 5.0 Modifies Your System
1.1 LINK.EXE Versions May Be Left in Path
1.2 WINA20.386 File
2. Solving Setup Problems
2.1 Priam and Everex Hard Disks
2.2 Syquest Removable Hard Disk
2.3 Bernoulli Drives
2.4 Disk Manager
2.5 Speedstor and Volume Expansion
2.6 Novell Partitions
2.7 Vfeature Deluxe
MS-DOS Editor <F1=Help> Press ALT to activate menus

The README.TXT file contains technical information about installing or upgrading MS-DOS 5.

To read this file from the DOS Shell with a mouse, follow these steps:

1. Point to the C:\DOS directory in the Directory Tree area in the upper left portion of the display and click the left mouse button.
2. Point to the Editor in the Program List area in the lower left portion of the display and double-click the left mouse button. If nothing happens, press ↵Enter.
3. In the dialog box, type **README.TXT** and press ↵Enter.
4. Read the information in the README.TXT file. Press PgUp and PgDn to see the entire file.
5. To leave the Editor, move the mouse pointer to the File menu at the top of the display and click the left mouse button. Then move the mouse pointer to the Exit menu choice and click the left mouse button.

To read this file from the DOS Shell with the keyboard, follow these steps:

1. Press Tab ⇤⇥ to highlight the Directory Tree area in the upper left portion of the display. Press ↓ and ↑ to highlight the \DOS directory.
2. Press Tab ⇤⇥ to highlight the Program List area in the lower left portion of the display. Press the ↓ and ↑ to highlight the Editor in the Program List area and press ↵Enter.
3. In the dialog box, type **README.TXT** and press ↵Enter.
4. Read the information in the README.TXT file. Press PgUp and PgDn to see the entire file.
5. To leave the Editor, press Alt, **T** for **F**ile, and **X** for Exit.

To read this file from the DOS prompt, follow these steps:

1. Type **CD\DOS** and press Enter.
2. Type **EDIT README.TXT** and press Enter.
3. Read the information in the README.TXT file. Press PgUp and PgDn to see the entire file.
4. To leave the Editor, press Alt, **F** for **F**ile, and **X** for E**x**it.

This file contains additional technical information about the installation that is outside the scope of this book.

If You Have Problems with MS-DOS 5

If you upgrade to MS-DOS 5 and you cannot operate your computer for any reason, you can revert to the previous version of DOS. This process is called uninstalling DOS 5. Do not try to uninstall if you used MS-DOS 5 to repartition or reformat your hard disk.

To uninstall DOS 5, insert the Uninstall (or Uninstall #1) disk that DOS created during the upgrade and hold down the Ctrl and Alt keys and press the Del key; then release all three keys to reboot your computer.

Follow the prompts to tell DOS to uninstall MS-DOS 5 and revert to your previous version of DOS.

Preserving DOS Shell Settings

You may need to reinstall MS-DOS 5 even if the installation was complete without error. With any of the following situations, you may find it easier to reinstall DOS. For example, you may have a marginal sector on your disk that goes bad, causing part of DOS to be unreadable. If you change your video display, such as from EGA to VGA, you must follow a complex procedure to upgrade the DOS installation. You will find it much easier to reinstall MS-DOS 5.

Another reason to install DOS again is to upgrade to future new version of MS-DOS 5. If you changed the DOS Shell settings or added program groups, this information is stored in a file named DOSSHELL.INI. After you reinstall MS-DOS 5 or install a future version of DOS 5, the DOSSHELL.INI file in the \DOS directory contains the original default settings. If the DOS Shell starts

automatically when you boot DOS, you can see that you lose any customizing or program groups. To recover the custom settings, you must copy your customized DOSSHELL.INI file to the \DOS directory.

If you are in the DOS Shell, press F3 to cancel the Shell and return to the DOS command line. Then copy DOSSHELL.INI from the old DOS directory to the \DOS directory.

If your old DOS directory was renamed OLD_DOS.2 during the upgrade and your new DOS directory is DOS, enter the following command:

COPY \OLD_DOS.2\DOSSHELL.INI \DOS and press ↵Enter.

If your old DOS directory had a different name, substitute that name for OLD_DOS.2 in the command.

To return to the DOS Shell, type **DOSSHELL** and press ↵Enter. The DOS Shell now reflects the changes that you made to the Shell in the previous version of MS-DOS 5.

Index

↓ key, 17, 172
↑ key, 17
← key. 17
→ key, 17, 196, 213
101-key Enhanced Keyboard, 19
/1 switch
  FORMAT command, 354
/4 switch
  FORMAT command, 354
/8 switch
  FORMAT command, 354

A

/A switch
  BACKUP command, 245-246, 335
  REPLACE command, 363
  XCOPY command, 374
/A: switch
  DIR command, 206
/A:attrib switch
  DIR command, 342
/A:date switch
  RESTORE command, 247
/A:mm-dd-yy switch
  RESTORE command, 364
access denied error
  message, 376
Add Program dialog box, 177-181
address bus, 30
Advanced Properties dialog box, 196
allocation error, size
  adjusted error message, 376
allocation unit, 116, 126
Alt key, 17
Alt-Esc key combination, 183
Alt-Tab key combination, 183
American Standard Code for
  Information Interchange, *see*
  ASCII
ANSI.SYS file, 37
APPEND command, 331-332
APPEND/ASSIGN conflict error
  message, 377
applications
  programs, 34-36, 44
  software, 104
ASCII, 14-15
  files, 252-254
ASSIGN command, 332
Associate File dialog box, 187
associations, 170, 292
asterisk (*) wild-card character, 109,
  219-220

AT-style keyboard, 19
ATTRIB command, 222, 333
AUTOEXEC.BAT file, 37, 268, 280-286
AUX device name, 304

B

/B switch
  DIR command, 206, 343
  FORMAT command, 354
/B:date switch
  RESTORE command, 247
/B:mm-dd-yy switch
  RESTORE command, 364
Backspace key, 17
backups, 226, 239-240
  AUTOEXEC.BAT file, 284-285
  bytes required, 261
  copying installations disks, 403-405
  floppy disks needed, 241-242
  hard disks, 328
    using batch files, 295
backslash (\), 92, 98
BACKUP command, 223, 239-246, 250, 274, 334-335
BACKUP.EXE file, 37
`bad command or file name` error message, 330, 377
`bad or missing keyboard definition file` error message, 378
`bad partition table` error message, 378
bad sectors, 126, 300-302
*.BAS file specification, 109
Basic Input/Output System, *see* BIOS
.BAT extension, 273
BATCH directory, 275
`batch file missing` error message, 378
batch files, 34, 45, 189, 268, 273-274
  backing up hard disks, 295
  creating, 274-279
  displaying commands on-screen, 328
  displaying help messages, 296
  executing programs, 291-294
  naming, 273
  organizing in directories, 102
  running, 280
  searching for, 269
    programs, 294
  starting programs, 194
  storing, 275
  viewing contents, 274
binary
  data, 30
  files
    redirecting, 306
    viewing, 256
BIOS, 34, 39
bits, 9, 30
blocks, 300
booting, 52-56, 402
Break key, 18
BUDGET.* file specification, 110
buffers, 268, 287
  input, 212-213
  loaded with DOSKEY, 310
BUFFERS command, 287-288
bugs, 229
bulletin board system (BBS), 29
buses, 30
bytes, 9, 30
  determining number needed for backups, 261
`bytes in bad sectors` error message, 130

C

/C switch
  FIND command, 352
cannot CHDIR to root error message, 378
cannot find system files error message, 379
cannot load COMMAND, system halted error message, 379
cannot load COMMAND.COM, system halted error message, 379
cannot perform a cyclic copy error message, 380
cannot read file allocation table error message, 380
cannot recover . entry, processing continued error message, 380
cannot recover . entry,entry has a bad attribute (or link or size) error message, 380
cannot start COMMAND.COM, exiting error message, 380
Caps Lock key, 17
CATAPULT.BAS file, 37
cathode ray tube, *see* CRT
CD \DATA\DOCS command, 283
CD command, 217-218, 222, 335-336
Central Processing Unit, *see CPU*
CHDIR command, 217-218, 222, 335-336
check box (dialog boxes), 76
chips, 10
CHKDSK command, 241, 250, 258-262, 283, 336-337
  determining number of bad sectors on disks, 301
clicking, 66, 70
clones, 10
CLS command, 263, 275, 337
clusters (lost), 252, 259
cold boot, 50-54
color graphics adapter (CGA), 14
COM1 device name, 304
COM2 device name, 304
COM3 device name, 304
COM4 device name, 304
command button (dialog boxes), 76-78
command file, 36
command interpreter, *see* COMMAND.COM
command line, 200
  editing keys, 213
  editor, see DOSKEY, 310
  executing programs from, 223
  starting DOS Editor from, 277
  using batch files, 274
  versus DOS Shell, 200, 310
command processors, *see* COMMAND.COM
COMMAND.COM file, 37-41, 59, 202, 211
  processing batch files, 273
commands, 34, 50, 200-202
  APPEND, 331-332
  ASSIGN, 332
  ATTRIB, 222, 333
  BACKUP, 223, 239-246, 250, 274, 334-335
  BUFFERS, 287-288
  CD, 217-218, 222, 335-336
  CD \DATA\DOCS, 283
  CHDIR, 217-218, 222, 335-336
  CHKDSK, 241, 250, 258-262, 336-337
    determining number of bad sectors on disks, 301
  CHKDSK/F, 283

CLS, 263, 275, 337
COMP, 338
COPY, 220-222, 239, 243, 249, 296, 339-340
COPY CON, 275-276
D:, 283
DATE, 282, 340-341
DEL, 210, 222, 349
DEVICE, 288-289, 341
DEVICEHIGH, 322
DIR, 205-210, 214-215, 222, 306-307, 342-343
  using wild cards, 219-220
DIR /O:D, 283
DIR /W, 58
Disk Copy, 160-166
DISKCOMP, 202, 343-344
DISKCOPY, 202, 223, 239, 344-345
DOSKEY, 346
DOSSHELL, 67, 283, 346-347
ECHO, 283, 295, 347-348
EDIT, 348
editing before execution, 316
EDITOR, 223
entering, 211
ERASE, 210, 222, 233, 349
executing, 212
  from DOS prompt, 59
external, 40, 59, 202, 269, 330
FASTOPEN, 350
FC, 351-352
FILES, 287
FIND, 307, 352-353
FORMAT, 116, 122, 126-131, 223, 233, 239, 353-354
frequently included in AUTOEXEC.BAT file, 282
HELP, 355
internal, 40, 59, 202, 269
issuing multiple commands, 274
JOIN, 355-356
LABEL, 264-265, 356
LOADHIGH, 322
MD, 222, 358
MEM, 258, 337, 356-357
MIRROR, 234, 239, 357-358
MKDIR, 222, 358
MORE, 307, 359
notation, 330
parameters, 59
PATH, 268-270, 282, 359-360
  within batch files, 284
PAUSE, 283, 295
PROMPT, 271-273, 282, 360-361
  within batch files, 284
Quick Format, 265
RD, 222, 365
recalling with DOSKEY, 310-315
RECOVER, 302
REN, 222, 361-362
RENAME, 222, 361-362
REPLACE, 362-363
RESTORE, 132, 223, 239-250, 363-364
RMDIR, 222, 365
rules, 203
Run, 186
sample syntax, 5
Search File, 256
SET TEMP, 283
SORT, 307, 365-366
stopping, 62-63
SYS, 366-367
TIME, 282, 367-368
TREE, 222, 306-307, 368-369
TYPE, 222, 256, 274, 280, 369
UNDELETE, 223, 235-237, 369-370
UNFORMAT, 234, 237-239, 370-371

VCONFIG, 283
VER, 263, 371
VERIFY, 263, 372
View File Contents, 274
VOL, 264, 372-373
XCOPY, 373-374
COMP command, 338
compatibles, 10
computers
calendar (setting), 45
clock (setting), 45
creating good working environment, 52-53
changing/displaying date, 328
CON device name, 304
CONFIG.SYS file, 37, 268, 286-287
adding HIMEM device driver, 319
creating, 290
device drivers, 288-290
editing, 290
EMM386 device driver, 320
enabling high memory support, 322
specifying buffers setting, 288
specifying number of files open, 287
`configuration too large` error message, 381
console, 300
`content of destination lost before copy` error message, 381
contiguous blocks, 262
control bus, 30
conventional, 300
memory, 289, 318
COPY command, 220-222, 239, 243, 249, 296, 339-340
COPY CON command, 275-276
COPY CON device, 304-305
COPYHELP.BAT file, 296
copying
between devices, 328
directories, 234
disks, 160-166, 328
File Allocation Table, 234
files, 135-138
across directories, 148-150
between disks, 144-146
decreasing copy time, 152
safety features, 151
selecting correct view, 138
to same disk directory, 147-148
installations disks, 403-405
programs, 179-180
CPU, 8, 30
CRT, 13
Ctrl key, 17
Ctrl-Alt-Del key combinations, 19, 62
Ctrl-Break key combinations, 19, 62
Ctrl-C key combinations, 19
Ctrl-Esc key combinations, 183
Ctrl-PrtSc key combinations, 19
Ctrl-S key combinations, 19, 218
current
directory, 43, 57, 134
changing, 106-107, 328
disk, 43
changing, 328
drive, 50, 56-57
changing, 215
`current drive is no longer valid` error message, 381
cursors, 13, 50
selection, 66

D

/D switch
BACKUP command, 245
RESTORE command, 364

D: command, 283
/D:date switch
  BACKUP command, 246
  XCOPY command, 374
/D:mm-dd-yy switch
  BACKUP command, 335
daisywheel printer, 28
data, 9, 29
  binary, 30
  preventing data loss, 227-228
    making backup copies, 239-243
    preventing hardware failures, 230-233
    preventing software failures, 229-230
    using MIRROR command, 234
  processing, 29-32
  recovering, 233, 302
    files from formatted disks, 237-239
    using /F switch, CHKDSK command, 259
    using UNDELETE command, 235-237
  verifying accuracy written to disk, 263
data bus, 30
DATA directory, 59
\DATA directory, 103
data error reading drive d
  error message, 381
databases, 12
date
  changing, 328
  displaying, 328
DATE command, 282, 340-341
defaults, 13
defragment, 252, 262
DEL command, 210, 222, 349
Delete key, 17, 213
delete tracking file, 226, 234
deleting
  characters, 328
  directories, 107-108, 329
  files, 157-158, 329
  non-text formatting information, 302
  program groups, 181
delimiters, 200-201, 211
densities, 118
desktop publishing software, 12
destination, 134
DEVICE command, 288-289, 341
device drivers, 288-289
  EMM386, 320-321
  HIMEM, 319-320
  loading into high memory, 321-322
  RAMDrive, 323-324
DEVICEHIGH command, 322
devices, 300-306
  copying between, 328
  device names, 304
  using new devices, 329
dialog boxes, 62, 66, 75-76
  Add Program, 177-181
  Advanced Properties, 196
  Associate File, 187
  check box, 76
  command button, 76-78
  entering text, 76
  list box, 76
  option button, 76
  Program Properties, 201
  selecting commands, 77-78
  text box, 76
  using scroll bars, 78-80
DIR /O:D command, 283
DIR /W command, 58
DIR command, 205-210, 214-215, 222, 306-307, 342-343
  using wild cards, 219-220
directories, 43, 50, 92-96, 233

BATCH, 275
changing, 217-218
collapsing, 101
copying, 234
  files, 147-150
creating new directories, 105-106, 329
current, 43, 57, 134
  changing, 106-107, 328
DATA, 59
deleting, 107-108, 329
directory paths, 43, 56
directory specifier, 92, 96
disks, 93
displaying specified files, 307-308
\DOS, 102
expanding single directories, 100
hiding subdirectories, 101
hierarchical, 92-93
logged directory, *see* current directory
managing, 43-44
moving files to, 155-156
organizing, 102-104
parent, 105
renaming, 160
root, 43, 94-95, 102, 275
searching, 98-99
selecting all files in, 140-143
setting alternative directories for programs, 329
storing listing of, 307
tree structure, 93-99
viewing, 109
  directory structure, 99-100
  modifying file display, 110-113
see also subdirectories
directory tree, 59, 215
  area (DOS Shell display), 69
  area title (DOS Shell display), 69
`disk boot failure` **error message**, 381
Disk Copy command, 160-166
disk drives, 8, 23-24
  changing current disk drive, 328
  matching to floppy disks, 119-120
Disk Operating System, *see* DOS
`disk unsuitable for system disk` **error message**, 382
Disk Utilities program group, 171
DISKCOMP command, 202, 343-344
DISKCOPY command, 202, 223, 239, 344-345
DISKCOPY utility, 160
diskettes *see* disks
disks, 8, 23-24
  bad sectors, 300-302
  capacities, 24
  comparing, 328
  copying, 160-166, 328
    files between, 144-146
    installations disks, 403-405
  current, 43
  defragmenting, 262
  determining available space, 241, 258-261
  displaying free space/subdirectories on, 328
DOS Master disk, 53
double-sided, 24
encoding, 117
erasing files/subdirectories, 265
floppy, 23-25, 116-117
  bad sectors, 301
  booting from, 53
  directories, 93
  formatting, 116-117, 120-124
  installing DOS on, 407-408
  labels, 134
  matching to disk drives, 119-120
  needed for file backups, 241-242
  preparing for file backups, 241

quick formatting, 127
safe formatting, 124
types, 25, 118-119
formatting, 124-127, 329
hard, 23-25
after completion of upgrading, 411-413
backing up, 295, 328
booting from, 53
directories, 93
formatting, 131-132, 329
installing DOS on, 405-407
upgrading, 409-410
managing, 44
moving files between, 152-154
operating systems, 40
organizing files on, 93
placing DOS on, 329
RAM, 300, 323-324
self-parking heads, 226, 232
unformatting, 233
uninstalling, 409
verifying accuracy of data written to disks, 263
volume labels, 123
modifying, 264-265
working, 402
write-protecting, 120
display, 8, 13-16
DOS Shell, 67-68
customizing, 83-86
pausing, 329
`divide overflow` error message, 382
*.DOC file specification, 109
DOS, 2, 12
benefits, 46-47
determining version active, 263, 328
Editor, 276
creating/editing CONFIG.SYS file, 290
menus, 278-279
starting, 277-288
files, 37-38
hardware requirements, 4
installing, 402-407
after completion, 411-413
from previous version of DOS, 408-410
Master disk, 53
placing on disk, 329
reinstalling, 413-414
services, 42-45
three main components, 38
uninstalling, 413
upgrading from previous version, 408-410
versions, 35, 46
restoring files, 249-250
\DOS directory, 102
DOS prompt, 38-39, 55-56, 270-271
customizing, 272-273
executing commands from, 59
DOS Shell, 38-39, 42, 50-51, 59-62, 66, 70
accessing help, 80-81
cancelling menu selections, 74
changing
colors, 87-88
display mode, 86-87
dialog boxes, 75-76
display, 67-68
customizing, 83-86
Dual File Lists view, 138-139
executing programs from, 121
F3 key, 19
File menu, 72
formatting floppy disks from, 121-123

Help menu, 72
icons, 68
loading, 67
menu bar, 72
Options menu, 72, 82, 86
preserving settings, 413-414
Program/File Lists view, 138
quitting, 88-89
running programs, 81-83
scroll bars, 78-80
selecting
  items, 70-72
  menu options, 73-74
shortcut keys, 88
starting DOS Editor from, 277
Task Swapper, 82-83
Tree menu, 72
using batch files, 274
versus command line, 200, 310
View menu, 72, 83
DOSKEY command, 310-317, 346
DOSSHELL command, 67, 283, 346-347
DOSSHELL.HLP file, 37
DOSSHELL.INI file, 37
dot-matrix printer, 28
double-clicking, 66, 70
double-sided disks, 24, 118
dragging, 66, 70, 134
drive letters (DOS Shell display), 69
`drive not ready` error message, 382
`drive or diskette types not compatible` error message, 382
drives
  copying disks, having two different types of drives, 164-165
  current,50, 56-57
    changing, 215
    logged *see* current drive
  matching to floppy disks, 119-120
Dual File Lists view, 138-139
`duplicate filename or file not found` error message, 382

E

/E switch
  XCOPY command, 374
/E:hh:mm:ss switch
  RESTORE command, 364
/E:time switch
  RESTORE command, 247
ECHO command, 283, 295, 347-348
EDIT command, 348
EDIT editor, 275
EDIT.COM file, 37
EDIT.HLP file, 37
editing
  AUTOEXEC.BAT file, 285
  commands before execution, 316
  input buffer, 213
Editor, 276
  creating/editing CONFIG.SYS file, 290
  menus, 278-279
  starting, 277-278
EDITOR command, 223
EDLIN editor, 275
EGA.CPI file, 37
electronic bulletin board systems (BBS), 229
EMM386 device driver, 320-321
enhanced graphics adapter (EGA), 14
Enhanced Keyboard, 20
Enter key, 17, 202, 205, 210-212
ERASE command, 210, 222, 233, 349

error in COUNTRY command error message, 383
error in EXE file error message, 383
error loading operating system error message, 383
error messages, 376-399
  common with FORMAT command, 129-131
error reading (or writing) partition table error message, 384
error reading directory error message, 384
Esc key, 18, 211-213
EXEC failure error message, 384
executable files, 36
expanded memory, 289, 300, 318-320
expansion slots, 22
extended ASCII codes, 14
extended graphics array adapter (XGA), 14
Extended keyboard, 19
extended memory, 289, 300, 319-320
extensions, 218
external commands, 40, 59, 202, 269, 330

F

F1 key, 196, 213
F2 key, 213
F3 key, 213
F4 key, 213
F5 key, 213
F6 key, 213
/F switch
  BACKUP command, 246
  CHKDSK command, 258-261
/F:size switch
  BACKUP command, 246, 334
  FORMAT command, 129, 354
FASTOPEN command, 350
FC command, 351-352
file allocation table, 116, 233-234
file cannot be copied onto itself error message, 384
file creation error error message, 385
File menu, 72
file not found error message, 385
filename device driver cannot be initialized error message, 385
files, 9, 23, 32, 36
  ANSI.SYS, 37
  ASCII, 252-254
  AUTOEXEC.BAT, 37, 268, 280-282
  backing up, 284-285
  creating/editing, 284-285
  mulitple versions, 286
  viewing, 284
backing up, 226, 239-244
BACKUP.EXE, 37
batch, 34, 45, 189, 268, 273-274
  backing up hard disks, 295
  creating, 274-278
  displaying commands on-screen, 328
  displaying help messages, 296
  executing programs, 291-294
  naming, 273
organizing in directories, 102
rules, 279-280
searching for batch files, 269
searching for programs, 294
starting programs, 194
storing, 275
viewing contents, 274

binary
redirecting, 306
viewing, 256
CATAPULT.BAS, 37
command, 36
COMMAND.COM, 37
comparing, 328
CONFIG.SYS, 37, 268, 286-288
adding HIMEM device driver, 319
creating, 290
device drivers, 288-290
editing, 290
EMM386 device driver, 320
enabling high memory support, 322
containing characters for entering directly from keyboard, 304-305
COPYHELP.BAT, 296
copying, 135-138
across directories, 148-150
between disks, 144-146
decreasing copy time, 152
safety features, 151
to same disk directory, 147-148
date/time stamps, 218-219
defragmenting, 252
delete tracking, 226, 234
deleting, 157-158, 329
displaying, 328
modifying file display, 110-113
DOSSHELL.HLP, 37
DOSSHELL.INI, 37
EDIT.COM, 37
EDIT.HLP, 37
EGA.CPI, 37
erasing on disks, 265
executable, 36
extensions, 187, 218
fixing, 328
FORMAT.COM, 37
fragmentation, 252, 261-262
hidden, 39
inactive, 104
KEYBOARD.SYS, 37
LCD.COM, 37
locating strings within, 328
loading data files, 187-189
managing, 42
MEM.EXE, 37
MIRROR.COM, 37
moving, 135-138, 329
between disks, 152-154
to another directory, 155-156
names, 218, 273
changing, 328
noncontiguous, 252
organizing on disk, 93
printing, 306
recovering, 302
deleted files, 235-237
redirecting output, 307
renaming, 158-160
restoring, 226, 329
avoiding DOS version conflicts, 249-250
from accidentally formatted disks, 237-239
fully, 248
more than one file, 249
selective restores, 248
single files, 249
searching for, 256-258
selecting, 139-143
setting/changing checks on, 329
sizes, 218-219
sorting, 329
source, 136, 139-143
specifying files in another directory, 215

temporary, 103-104
text, 36
undeleting, 233
viewing, 252-255
files area (DOS Shell display), 69
files area title (DOS Shell display), 69
FILES command, 287
filters, 300, 307-310
FIND command, 307, 352-353
FIND filter, 307-308
`FIRST diskette bad or incompatible` **error message**, 385
fixed, *see* hard disks
floppies, *see* floppy disks
floppy disks, 23-25, 116-117
bad sectors, 301
booting from, 53
directories, 93
formatting, 116-117, 120
quick formatting, 127
using DOS Shell, 121-124
installing DOS on, 407-408
labels, 134
needed for file back ups, 241-242
types, 25, 118-120
FORMAT command, 116, 122, 126-129, 223, 233, 239, 353-354
error messages, 129-131
`Format not supported on drive x:` **error message**, 385
FORMAT.COM file, 37
formats
hexadecimal, 254
low-level, 402
formatting, 116
disks, 124-125, 329
hard disks, 131-132, 329
fragmentation, 252, 261-262
function keys, 16-19

G

games software, 12
gas plasma, 13
`General failure reading (or writing) drive d` **error message**, 386
Graphical User Interface, *see* GUI
graphics
display, 15-16
mode, 15
software, 12
GUI, 66

H

hard disks, 23-25
backing up, 328
using batch files, 295
booting from, 53
directories, 93
formatting, 131-132, 329
installing DOS on, 405-407
upgrading, 409-410
after completion, 411-413
hardware, 11
peripheral, 240
preventing failures, 230-233
requirements for running DOS, *4*
head-parking program, 226, 232
HELP command, 355
Help menu, 72
help screens, 51
hexadecimal, 252-254
hidden files, 39
hierarchical directories, 92-93
high memory, 300, 321-322
HIMEM device driver, 319-320
HIMEM.SYS extended memory manager, 289
home finance software, 12

I

/I switch
FIND command, 352
icons, 66-68
Incomplete file error message, 302
incorrect MS-DOS version error message, 386
inkjet printer, 28
input, 9, 27-29, 302
alphabetizing, 308-309
buffer, 212-213
input device, 16
input/output system, 39
redirecting input of programs, 329
Ins key, 17, 213
insert disk with batch file and strike any key when ready error message, 386
Insert disk with COMMAND.COM in drive d and strike any key when ready error message, 386
install procedure, 189
Install program, 43
installing
DOS, 402-410
programs, 190
insufficient disk space error message, 386
insufficient memory error message, 387
insufficient memory to store macro. Use the DOSKEY command with the /BUFSIZE switch to increase available memory error message, 387
integrated circuits, *see* chips
integrated programs software, 12
interface, 34, 44
intermediate file error during pipe error message, 387
internal commands, 40, 59, 202, 269
internal stack over flow system halted error message, 388
International Business Machine Corporation's Personal Computer (IBM PC), 4
invalid characters in volume label error message, 388
error message, 388
invalid COMMAND.COM, system halted error message, 388
invalid date error message, 389
invalid device parameters from device driver error message, 389
invalid directory error message, 389
invalid disk change error message, 389
invalid drive in search path error message, 389-390
invalid drive or file name error message, 390
invalid drive specification error message, 390
invalid drive specification specified drive does not exist, or is non-removable error message, 390
invalid file format error message, 302
invalid media error message, 131
invalid media or track 0 bad - disk unusable error message, 391

invalid number of parameters error message, 391
invalid parameter combination error message, 391
invalid parameter incorrect parameter error message, 391
invalid partition table error message, 391
invalid path or file name error message, 392
invalid time error message, 392
invalid volume ID error message, 392

J-K

JOIN command, 355-356
\KEEP directory, 104
KEYBOARD.SYS file, 37
keyboards, 16-18
  selecting DOS Shell menu options, 73-74
  selecting items in DOS Shell, 71-72
  types, 19-21
keys
  ↓ , 17, 172
  ↑ , 17, 172
  → , 17, 196, 213
  ←, 17, 172, 310
  Break , 18
  Delete , 17, 213
  Enter, 17, 202, 205, 210-212
  Esc , 18, 211-213
  editing keys
    DOSKEY, 317
    for command line, 213
  F1, 196, 213
  F2, 213
  F3, 213
  F4, 213
  F5, 213
  F6, 213
  for recalling previous commands, 316
  function, 16-19
  Ins, 17, 213
  Num Lock, 18
  Pause, 18
  Prt Sc, 18
  Scroll Lock, 18
  Shift, 17
  shortcut, 66, 70, 88
  special, 17-18
  Tab, 172
kilobytes, 9, 24, 261

L

/L switch
  DIR command, 206, 343
  FC command, 351
/L:d:path\logfile.ext switch
  BACKUP command, 334
/L:file switch
  BACKUP command, 246
/L:hh:mm:ss switch
  RESTORE command, 364
/L:time switch
  RESTORE command, 247
LABEL command, 264-265, 356
labels, 134
laser printer, 28
/LBn switch
  FC command, 351
LCD.COM file, 37
liquid crystal displays (LCDs), 13
list box (dialog boxes), 76
LOADHIGH command, 322
loading
  data files, 187-189
  DOS Shell, 67

`lock violation` **error message**, 392
logged
  directory, *see* current directory
  drive, *see* current drive
lost clusters, 252, 259
low-level format, 402
LPT1 device name, 304
LPT2 device name, 304
LPT3 device name, 304

M

/M switch
  BACKUP command, 245-246, 334
  RESTORE command, 247, 364
  XCOPY command, 374
Mace Utilities, 233, 262
machine code, 319
Main program group, 171-172
math coprocessors, 22
MD command, 222, 358
megabytes, 9, 24, 261
MEM command, 258, 337, 356-357
MEM.EXE file, 37
memory, 300
  conventional, 289, 318
  displaying amount available, 258, 328
  expanded, 289, 300, 318-320
  extended, 289, 300, 319-320
  high, 300, 321-322
  HIMEM extended memory manager, 319-320
  managing, 319-324
  reserved, 300, 318, 321
  upper, 300, 318
  XMS, *see* extended memory,
`memory allocation error cannot load COMMAND, system halted` **error message**, 393
memory-resident program, 300, 322
menu bar (DOS Shell display), 68, 72
menus
  selecting DOS Shell menu options, 73-74
  in DOS Editor, 278-279
  pop-down, 66, 72
messages, 196
  displaying help messages with batch files, 296
  error, 375-399
meta-strings, 268, 271-272
microcomputer, 10
microfloppies, 24
microprocessor, 10
Microsoft Works, 277
minifloppies, 24
`MIRROR cannot operate with a network` **error message**, 393
MIRROR command, 234, 239, 357-358
MIRROR.COM file, 37
\MISC directory, 104
`missing operating system` **error message**, 393
MKDIR command, 222, 358
modems, 9, 29
modes
  DOS Shell display mode, 86-87
  graphics, 15
monitors, *see* display
monochrome display adapter (MDA), 14-15
monochrome graphics adapter (MGA), 14
MORE command, 307, 359
MORE filter, 309-310
motherboard, 22
mouse, 26, 60
  clicking, 66, 70
  copying files, 135

double-clicking, 66, 70
dragging, 66, 70, 134
mouse cursor, 26
mouse pointer, 66, 69
moving files, 135
point-and-shoot, 134-135, 145
selecting items in DOS Shell, 70-73
moving
  files, 135-138
    between disks, 152-154
    selecting correct view, 138
    to another directory, 155-156
  programs, 181
MS-DOS, *see* DOS
multiple directory structure, 93

N-O

/N switch
  FC command, 351
  FIND command, 352
  RESTORE command, 247, 364
/N:xx switch
  FORMAT command, 354
`no free file handles cannot start COMMAND, exiting` error message, 393
`no paper` error message, 394
`no room for system on destination disk` error message, 394
`no system on default drive` error message, 394
`no target drive specified` error message, 394
non-contiguous blocks, 252, 262
`non-DOS disk` error message, 394
`non-system disk or disk error Replace and strike any key when ready` error message, 394
Norton Utilities, 233, 262
`not enough memory` error message, 394
`not ready` error message, 395
NUL device name, 304
Num Lock key, 18
/O: switch
  DIR command, 206
operating systems, 12, 34-35
  for disks, 40
option button (dialog boxes), 76
Options menu, 72, 82, 86
`out of environment space` error message, 395
`out of memory` error message, 395
output, 9, 27-29, 302
  examining formatted disks, 126-127
  redirecting, 306-307
    output of programs, 329
overwrite, 134

P

/P switch
  DIR command, 204-206, 342
  REPLACE command, 363
  RESTORE command, 246, 364
  XCOPY command, 374
`packed file corrupt` error message, 395
parallel ports, 28
parameters, 59, 170, 190, 200, 203, 211
  optional paramter specifications in programs, 195-197
  replaceable, 170, 191, 194, 291
`parameters not supported on drive` error message, 395
parent directory, 105

partitions, 402
PATH command, 268-270, 282, 359-360
  within batch files, 284
`path not found` error message, 395
`path too long` error message, 396
paths, 43, 56, 96-98, 200
  path names, 92, 96-98, 215-217
  starting search path, 98-99
  within directory tree structure, 96
PAUSE command, 283, 295
Pause key, 18
PC, *see* computer
PC Tools Deluxe, 262
peripheral hardware, 8, 21, 25, 240, 288
  modems, 29
  mouse, 26
  printers, 27-29
  see also, devices
picture element, *see* pixels
pipe (|) symbol, 307
pipes, 300
  output between programs, 329
pixels, 14
point-and-shoot, 134-135, 145
pop-down menu, 66, 72
ports, 28
Power On Reset (POR), 54
Power-On Self-Test (POST), 55
`Press any key to return to MS-DOS Shell` message, 196
printers, 27-29
  redirecting output, 306
PRN device name, 304
program area (DOS Shell display), 69
program area title (DOS Shell display), 69
program groups, 120, 170-171
  adding programs, 175-177
  copying programs to, 179-180
  creating new program groups, 173-175
  deleting, 181
  opening, 172
  running, 172
    programs, 182
Program Properties dialog box, 201
`program too big to fit in memory` error message, 396
Program/File Lists view, 138
programs, 31, 34-36, 44
  adding to program groups, 175-177
  applications, 34-36, 44
  cancelling, 184
  contained in Main program group, 172
  copying to program groups, 179-180
  developing association to file extension, 187
  executing, 36
    from command line, 223
    from DOS Shell, 121
    with batch files, 291-294
  head-parking program, 226, 232
  including parameters when starting, 190
  Install, 43
  installing, 190
  loading
    into high memory, 321-322
    multiple programs, 183
  memory-resident, 300, 322
  moving, 181
  optional paramter specifications, 195-197
  piping output between, 329

properties, 181-182
redirecting input/output, 329
removing from Active Task list, 184
running
from File list, 185
from program groups, 182
from Run command, 186
in DOS Shell, 81-83
searching for, 269
using batch files, 294
setting alternative directories, 329
SMARTDRV.SYS disk caching, 290
starting, 187-190
using batch files, 194
"swapping", 183-185
TSR, 322
using replaceable parameters, 191, 194
PROMPT command, 271-273, 282-284, 360-361
prompts, 50, 56, 201
DOS, 56, 270-273
executing commands from, 59
system, 329
properties, 170, 181-182
Prt Sc key, 18

Q

/Q switch
FORMAT command, 354
quad-density, 118
Que's MS-DOS 5 User's Guide, Special Edition, 289-290, 299, 318, 405, 409, 274
question mark (?) wild-card character, 219-220
Quick Format command, 265
quick formatting, 127
QWERTY layout, 16

R

/R switch
REPLACE command, 363
RAM, *4*, 30, 261
RAM disk, 300, 323-324
RAMDrive, 323-324
random-access memory, *see RAM*
RD command, 222, 365
`read fault error reading drive d` error message, 396
read-only memory, *see* ROM
RECOVER command, 302
redirection, 300-302
symbols, 306
REN command, 222, 361-362
RENAME command, 222, 361-362
REPLACE command, 362-363
replaceable parameters, 170, 191, 194, 291
reserved
device name, 275
memory, 300, 318, 321
resolution, 14
restore, 226
RESTORE command, 132, 223, 239-250, 363-364
RMDIR command, 222, 365
ROM, 30, 39
ROM BIOS, 39-41
root directory, 43, 94-95, 102, 275
rule of currents, 57
Run command, 186

S

/S switch
  BACKUP command, 246, 334
  DIR command, 206, 343
  FORMAT command, 128, 242, 353
  REPLACE command, 363
  RESTORE command, 246, 249, 364
  XCOPY command, 374
safe formatting, 124
`same parameter entered twice` error message, 396
screens
  clearing, 263, 328
  displaying
    batch file commands on, 328
    screens singly, 309-310
    text files on, 328
    text strings on, 328
  scrolling, 218
  see also display
scroll bars (DOS Shell display), 69, 78-80
Scroll Lock key, 18
scrolling, 206, 218
Search File command, 256
searching
  directories, 98-99
  for files, 216-217, 256-259, 269
  for programs, 269
    using batch files, 294
  for strings within files, 328
`SECOND diskette bad or incompatible` error message, 385
`sector not found` error message, 301
`sector not found error reading drive d` error message, 396
sectors, 116-117
  bad, 126, 300-302
`seek error` error message, 301
`seek error reading (or writing) drive d` error message, 396
selecting
  Dual File Lists view, 139
  files, 139-143
    all files in directory, 140-143
    source files, 139-143
  items, 70-72
selection cursor, 66, 69
self-parking heads, 226, 232
serial ports, 28
SET TEMP command, 283
setup procedure, 189
shell, 51
Shift key, 17
shortcut keys, 66, 70, 88
single-sided floppy disks, 118
slash marks (/), 201
SMARTDRV.SYS disk caching program, 290
software, 11-12
  preventing software failures, 229-230
SORT command, 307, 365-366
SORT filter, 308-309
`SOURCE diskette bad or incompatible` error message, 396
source file, 134-136
  selecting, 139-143
speadsheets, 12
special keyboards, 21
special keys, 17-18
Startup Directory, 177, 190
static electricity, 226, 231
status line (DOS Shell display), 69

strings, 328
subdirectories, 43, 92-95
  displaying subdirectories on disks, 328
  erasing on disks, 265
  hiding within directory, 101
  see also directories
surge suppressor, 226, 230
switches, 125, 200, 204-205
  /1
    FORMAT command, 354
  /4
    FORMAT command, 354
  /8
    FORMAT command, 354
  /A
    BACKUP command, 245-246, 335
    REPLACE command, 363
    XCOPY command, 374
  /A:
    DIR command, 206
  /A:attrib
    DIR command, 342
  /A:date
    RESTORE command, 247
  /A:mm-dd-yy
    RESTORE command, 364
  /B
    DIR command, 206, 343
    FORMAT command, 354
  /B:date
    RESTORE command, 247
  /B:mm-dd-yy
    RESTORE command, 364
  /C
    FIND command, 352
  /D
    BACKUP command, 245
    RESTORE command, 364
  /D:date
    BACKUP command, 246
    XCOPY command, 374
  /D:mm-dd-yy
    BACKUP command, 335
  /E
    XCOPY command, 374
  /E:hh:mm:ss
    RESTORE command, 364
  /E:time
    RESTORE command, 247
  /F
    BACKUP command, 246
    CHKDSK command, 258-261
  /F:size
    BACKUP command, 246, 334
    FORMAT command, 129, 354
  /I
    FIND command, 352
  /L
    DIR command, 206, 343
    FC command, 351
  /L:d:path\logfile.ext
    BACKUP command, 334
  /L:file
    BACKUP command, 246
  /L:hh:mm:ss
    RESTORE command, 364
  /L:time
    RESTORE command, 247
  /LBn
    FC command, 351
  /M
    BACKUP command, 245-246, 334
    RESTORE command, 247, 364
    XCOPY command, 374
  /N
    FC command, 351
    FIND command, 352
    RESTORE command, 247, 364

/N:xx
FORMAT command, 354
/O:
DIR command, 206
/P
DIR command, 204-206, 342
REPLACE command, 363
RESTORE command, 246, 364
XCOPY command, 374
/Q
FORMAT command, 354
/R
REPLACE command, 363
/S
BACKUP command, 246, 334
DIR command, 206, 343
FORMAT command, 128, 242, 353
REPLACE command, 363
RESTORE command, 246, 249, 364
XCOPY command, 374
/T
BACKUP command, 245
FC command, 351
/T:hh:mm:ss
BACKUP command, 335
/T:time
BACKUP command, 246
/T:xx
FORMAT command, 354
/U
FORMAT command, 128, 354
REPLACE command, 363
/V
Disk Copy command, 165-166
FIND command, 352
FORMAT command, 353
XCOPY command, 374
/W
DIR command, 204-206, 276, 306, 342
FC command, 351
REPLACE command, 363
XCOPY command, 374
/xxxx
FC command, 351
symbols
pipe (|), 307
redirection, 306
syntax, 200-205
APPEND command, 331
ASSIGN command, 332
ATTRIB command, 333
BACKUP command, 243-244, 334
CD command, 335
CHDIR command, 335
CHKDSK command, 258, 336
CLS command, 337
COMP command, 338
converting extended memory to expanded memory, 320
COPY command, 220, 339
DATE command, 340
DEL command, 349
DEVICE command, 288, 341
DIR command, 205, 342
DISKCOMP command, 344
DISKCOPY command, 345
DOSKEY command, 346
DOSSHELL command, 346
ECHO command, 347
EDIT command, 348
ERASE command, 349
FASTOPEN command, 350
FC command, 351
FIND command, 352
for creating RAM disks, 323
FORMAT command, 353
HELP command, 355
JOIN command, 355
LABEL command, 264, 356
MD command, 358
MEM command, 357

MIRROR command, 234, 357
MKDIR command, 358
MORE command, 359
PATH command, 360
PROMPT command, 360
RD command, 365
RENAME command, 361
REPLACE command, 362
RESTORE command, 247, 363
RMDIR command, 365
sample syntax, 5
SORT command, 366
SYS command, 366
TIME command, 367
TREE command, 368, 369
UNDELETE command, 370
UNFORMAT command, 238, 370
VER command, 371
VERIFY command, 372
VOL command, 373
XCOPY command, 373
syntax error **error message**, 397
SYS command, 366-367
system
defaults, 281
prompt, 329
unit, 21-23

T

/T switch
BACKUP command, 245
FC command, 351
/T:hh:mm:ss switch
BACKUP command, 335
/T:time switch
BACKUP command, 246
/T:xx switch
FORMAT command, 354
target, 134
TARGET diskette bad or incompatible **error message**, 397
target diskette may be unusable **error message**, 397
TARGET media has lower capacity than SOURCE continue anyway (Y/N)? **error message**, 397
Task Swapper, 82-83
enabling, 182
TAX199*.* file specification, 110
\TEMP directory, 103-104
terminate-and-stay-resident program, *see* TSR program
text
box (dialog boxes), 76
files, 36
strings, 328
there is not enough room to create a restore file. you will not be able to use the unformat utility P with format (Y/N)? **error message**, 398
time (changing/displaying), 328
TIME command, 282, 367-368
title bar (DOS Shell display), 68
Track 0 bad - disk unusable **error message**, 131
tracks, 23, 116-117
TREE command, 222, 306-307, 368-369
Tree menu, 72
tree structure, 92-96
paths within, 96-99
TSR program, 300, 322
TYPE command, 222, 256, 274, 280, 369

U-V

/U switch
  FORMAT command, 128, 354
  REPLACE command, 363
unable to create directory error message, 398
unable to load MS-DOS Shell, Retry (y/n)? error message, 398
unable to write BOOT error message, 398
UNDELETE command, 223, 235-237, 369-370
UNFORMAT command, 234, 237-239, 370-371
unformatting, 116
uninstall, 402, 413
  disks, 409
unrecognized command in CONFIG.SYS error message, 399
unrecoverable read error on drive x side n, track n error message, 399
unrecoverable write error on drive x Side n, track n error message, 399
upper memory, 300, 318
utilities
  DISKCOPY, 160
  organizing in directories, 103
  software, 12
/V switch
  Disk Copy command, 165-166
  FIND command, 352
  FORMAT command, 353
  XCOPY command, 374
variables, 5
VCONFIG command, 283
VER command, 263, 371
VERIFY command, 263, 372
video graphics array adapter (VGA), 14
View File Contents command, 274
View menu, 72, 83
viruses, 229-230
VOL command, 264, 372-373
voltage regulator, 230
volume labels, 116, 123
  displaying, 328

W-Z

/W switch
  DIR command, 204-206, 276, 306, 342
  FC command, 351
  REPLACE command, 363
  XCOPY command, 374
warm boot, 50-51, 56
wild cards, 109, 200, 219-220
windows, 59-60
.WK file specification, 110
word processor's software, 12
working disks, 402
write fault error writing drive d error message, 399
write protect error writing drive d error message, 399
XCOPY command, 373-374
XMS memory, *see* extended memory
/xxxx switch
  FC command, 351

Back-up Command

Backup C:\Dir*.* B:/S

XTG

To Compress use Zip CtrlF5, note you must name file, and after copying file's Delet the zip file

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